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# NEW SOLUTIONS FOR THE NEW NORMAL

**Abstract**

The COVID-19 outbreak has disrupted social and economic global norms and accelerated many of the key trends shaping the building industry. The ongoing aftermath of uncertainty has led to a sharp drop in real estate investment volumes and commercial rental prices. Owners/operators and tenants are grappling with several key questions and searching for solutions and strategies on how best to move forward. While the economic impact is unprecedented, with billions of dollars of dry-powder capital in the market and record low interest rates, there are significant possibilities for owners/operators to pivot and take advantage of new opportunities.

The design and development community, emerging from the defensive stage of pandemic response to a more forward-looking approach, is responding. This paper explores some of the key questions from the owner/operator community and presents the "New Solutions Toolkit," a growing collection of holistic and practical solutions for lasting resilience and a roadmap to future opportunity.

## Introduction

The events of 2020 and the effects of the on-going pandemic have impacted the world's social and economic norms, creating a seismic shift in the real estate market and the ways our cities function. Occupancy levels are currently running at about 10-15 percent globally, with a large percentage of employees still working from home (JLL 2020). Retail footfall has dropped by 50 percent in some markets as shoppers switch to online vendors (Abraham 2020). This creates a knock-on effect for building management, mass transit and food & beverage (F&B) outlets, and a strong feeling of uncertainty, which has fueled a significant drop in real-estate investment and rental prices in the first half of 2020 (JLL 2020).

Building owners/operators globally are being challenged by dynamic building occupancy, rapidly evolving tenant demands and regulatory environment. The rate of change caused by COVID-19 caught the development community off-guard and further underlines the importance of resilience and adaptability. The challenges posed by the pandemic are complex, and no single solution or strategy has emerged.

This complexity drives the need for a holistic approach of assessment and a toolkit of practical solutions that can be applied to the evolving situation. The building industry needs strategies to manage risk and hygiene to combat the transmission of COVID-19 and future diseases, but also new thinking on how to create resilient spaces that allow for high-value interaction and increased health and wellness in the workplace. The speed of change driven by COVID-19 has also been a surprise, which further underlines the importance of adaptability and resilience to ensure the longevity and competitiveness of an asset.

In this environment of uncertainty, owners/operators are grappling with the key question of what practical steps they can take to address the ongoing pandemic, and what strategies can be implemented to increase resilience to future events. Interestingly the conversation is evolving beyond "pandemic defence" and is now moving into "what is next?" The traditional model is now disrupted, and this gives an outlook on the long-term effects. And while investments are in a downturn, with billions of dollars of capital in the market, combined with record low interest rates, there are new possibilities for ambitious owners/operators to pivot and create fresh opportunities in the new normal.
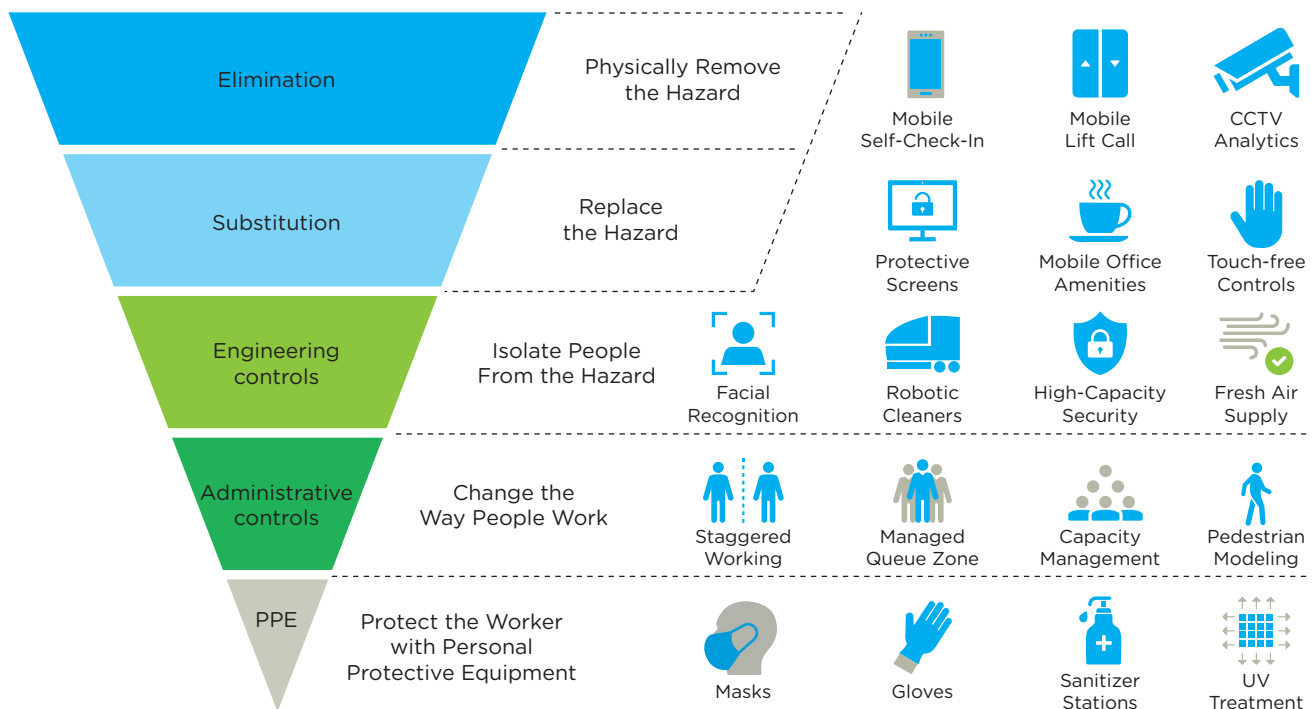
Figure 1. The Hierarchy of Controls is a commonly accepted system for reducing risk. On the pyramid, the higher the action, the more effective it is considered to be in the long term. The icons to the right represent some of the specific solutions that can be implemented in the workplace to effectuate each control action. © Ramboll

## Challenges

The challenges posed by the pandemic are wide-ranging and vary by sector; from basic hygiene, health and safety to reimagining the office workspace. Ramboll has opened a dialogue with clients across the built environment space, and while this is an evolving situation, five primary themes have consistently been raised across several categories:

- People Flow: "How do I safely and efficiently manage the flow of people inside and outside of my development?"
- Pinch Points: "How can I safely manage 'pinch points' and confined spaces like lobbies and elevators?
- Workforce: "How do I efficiently manage my workforce to meet the new requirements?"
- Wellness/User Experience: "How do I ensure my tenants are incentivised to come back to work?"

- Investment: "How do I make informed investment decisions to support the long-term resilience and adaptability of my development?"

## Toolkit for the New Normal

The pandemic has created challenges with a diverse range of complexity for owner/operators, with no single "silver bullet" solution emerging. On that basis, Ramboll has developed a multi-disciplinary methodology to assess the challenges. Through research and collaboration with scientists, consultants and suppliers, the team has created a growing toolkit of practical solutions. For assessment, the team has adapted a set of standard analysis and modeling packages to provide specific insights regarding the challenges of the pandemic. These include, but are not limited to:

### User Journey Mapping

This process maps the users through a development, effectively tracking the interaction they have with spaces and systems in the building. This process is used to identify the areas that warrant further analysis and potential intervention.

### People Flow Simulations

Pedestrian modelling software is used for key spaces in the building. The interaction of people in the space is mapped, and "pinch points," or risk areas resulting from confined interactions, are identified.

### Computational Analysis

Detailed analyses, such as computational fluid dynamics (CFD) modeling, is utilised for a thorough assessment of the "pinch points" to develop and test specific interventions appropriate to the space.

Solutions are proposed by considering a combination of operational, technological and architectural interventions.

Proposals are influenced and inspired by many of the global trends that have accelerated in 2020, such as digitalisation, automation, attentiveness to user experience, and wellness.

The New Solutions Toolkit has a strong grounding in science. It is based on the principles of the Hierarchy of Controls, which is widely used in industrial settings, and is accepted and promoted by several safety organisations to manage risk, including the US Occupational Safety and Health Administration (OSHA) and the UK Health and Safety Executive, UK (HSE) (see Figure 1).

"With billions of dollars of dry powder capital in the market and record low interest rates, there are significant possibilities for owners/operators to pivot and take advantage of new opportunities."



Figure 2. Potential solutions from the toolkit, relating to people flow, social distancing and optimising circulation potential around restricted entrances and exits. © Ramboll

| Challenge | | Solution | | Suppliers |
|-----------|--|----------|--|-----------|
| | Check In | | Automatic self-service check in system | Canon MaChex |
| | Temperature Check | | Infrared Camera | Intercorp Pensees |
| | Mask Check | | CCTV Analytics | IntelliVision ISS |

The Hierarchy of Controls is a system that classifies the effectiveness of design solutions or operational measures in managing risk in the built environment. The inverted pyramid graphic creates a hierarchy of solutions, with those at the top considered more effective than the ones at the bottom.

As shown in the graphic, administrative controls and personal protective equipment (PPE) are the initial response to the pandemic, and will continue to serve this purpose in the short- to medium-term, but in the long term, are considered less effective. Design and engineering solutions at the top of the pyramid are more sustainable, long-term solutions, and are considered more effective.

### People Flow
"How do I safely and efficiently manage the flow of people inside and outside of my development?"

According to Forbes, "As much as 96 percent of personal movement in the world's major cities vanished as mayors imposed lockdowns (in March 2020) to slow the spread of COVID-19" (McMahon 2020). People flow is the lifeblood of the city. The active and free flow of people, goods and services is a key enabler of healthy, modern urbanism. The COVID-19 pandemic and aftermath have demonstrated the vulnerabilities of the contemporary city and point to how constraints on people's movement have devastating social and economic effects.

The drop in free pedestrian movement in our urban centers, which was originally the effect of work-from-home orders, is now largely a response to the public perception of risk and compliance with new regulations. The key challenge for optimising circulation presented by the pandemic is social distancing. Under normal circumstances, humans interact with each other at an average distance of 0.7 meters, whereas social distancing guidelines and regulations

resulting from the pandemic have widely increased this to between 1 and 2 meters. These new requirements significantly reduce the safe capacity for public spaces.

To address this challenge, Ramboll utilises a combination of operational and analytical tools that have been employed to assess user journeys in buildings prior to the pandemic. By testing the existing layout and configuration using customised pedestrian modeling, problem areas that create risk or non-compliance can be identified. Once these problem areas are identified, interventions from the New Solutions Toolkit can be selected, including operational controls, new technology and temporary or permanent reconfiguration of the space, to enable the return to productive operations.

The regulatory response to the pandemic varies significantly globally, and legal requirements for building owners are very fluid. Entrance to public places in some Asian countries like Singapore are highly regulated, with several different controls, such as temperature and personal protection checks, as well as contact tracing. Conversely, control requirements in some Western countries are down to local interpretation.

The variance in entrance control requirements is a significant constraint to access to public commercial spaces. The New Solutions Toolkit provides several options to address these evolving access requirements with a combination of technologies, such as analytics cameras and automatic check-in systems that are now emerging on the market. Figure 2 illustrates potential solutions to public building access and people flow restrictions.

## Pinch Points
"How can I safely manage 'pinch points' and confined spaces like lobbies and elevators?"

As William Schaffner, a professor of preventive medicine at Vanderbilt University, said in an interview with Business Insider "This virus really likes people being indoors in an enclosed space for prolonged periods of close face-to-face contact" (Meisenzahl 2020). The toolkit uses user journey mapping to identify spaces for close contact and classifies them as "pinch points."

As an example, elevators present a "pinch point" that is fundamental to the operation of tall buildings. The key dilemmas come into focus when vertical transportation volumes are analysed, while considering practices and regulations such as social distancing. When applying social distancing measures, a 21-person elevator capacity is reduced to three to five persons. Clearly, a 70 percent reduction in vertical transport capacity will have a significant impact on building operations and create queues and pinch points in other spaces. Additional challenges include traditional elevator operation with touch and call selection buttons, which pose a direct risk to users based on the common touch surfaces. This is further compounded by the perceived risk of virus spread



Figure 3 illustrates the challenges and potential solutions to the "pinch point" problem presented by elevators.

| Challenge | | Solution | | Suppliers |
|---|---|---|---|---|
| | Capacity Management | | Destination Control System | Fujitec KONE Schindler |
| | Touch surfaces | | Integrated touch free lift control | Fujitec KONE Schindler |
| | Air Quality | | Filtration, UV treatment, Ionization | Fujitec KONE Schindler |
| | Surface Cleaning | | UV Treatment (unoccupied) | Fujitec KONE Schindler |

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through the close quarters of the elevator car. Elevators highlight some of the challenges building users will face in the new daily journey, but there are many other obvious "pinch points," such as lobbies, corridors, and meeting rooms.

To address "pinch points," the team evaluates each problem holistically, utilising detailed analysis such as pedestrian modeling, vertical transport software for elevator performance, and CFD to understand the environmental conditions of enclosed spaces. Once the "pinch points" are identified, and the real risk quantified, the team then presents a set of options available to the client to mitigate the challenges and improve the overall building performance.

To assess the options, the team engages with industry, owners and suppliers to understand which operational practices, technologies, and spatial reconfigurations will yield the best outcome. Operational controls, such as staggered working hours, or engineering solutions, including enhancement of building systems, are considered. Ultimately, the team revises the user journeys to incorporate the proposed solution and inform where PPE should be employed as a last line of defence.

### Workforce
"How do I efficiently manage my workforce to meet the new requirements?"

As people return to work and buildings are seeing increases in occupancy, owners and operators find the new requirements and regulations are driving an increase in staff and manpower. While the regulatory response varies regionally, building owners are facing new tasks such as

temperature and PPE checks, contact tracing, enhanced cleaning regimes and controlling the use of some spaces. In addition, some tenants are requesting their own unique requirements to ensure the welfare of their staff, all of which entail building operations staff carrying out additional duties. The impact of these new tasks can increase building operation staffing requirements, and with it, associated costs. Furthermore, these responses often create barriers that discourage people from utilising facilities such as retail and F&B areas.

Clearly this is not ideal, and a starting point for potential solutions can be found in the accelerating trends of digitalisation and automation in the built environment. Many

technologies available on the market, such as infrared (IR) cameras at public entry points, are now as commonplace as access control and visitor management systems.

In the initial pandemic response, technologies have been utilised mainly as part of manual processes. Industry thinking is evolving rapidly, and now, the technology required for these new tasks is being packaged into integrated solutions to address staffing requirements (see Figure 4).

For example, surveillance analytics are coming to market that can provide temperature checking, monitor social distancing, and check for masks or other PPE as required. The good news is, for buildings with existing, modern systems,
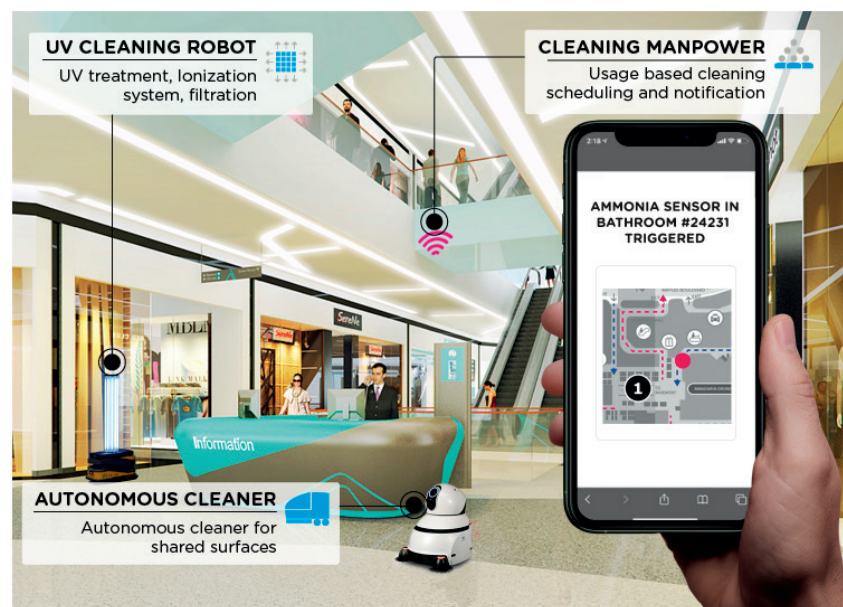


Figure 4. Challenges and potential solutions to the increased cleaning and operational staffing issues caused by new restrictions for controlling viral spread. AGV = automated guided vehicle.

| Challenge | | Solution | | Suppliers |
|---|---|---|---|---|
| | Workforce Management | | Occupancy-Eased Cleaning Schedule | Siemens Schneider Electric |
| | Surface Cleaning | | UV Treatment | Kaze OTSAW PBA Group |
| | Cleaning | | Cleaning AGV | Globotix Lionsbot |

these new services can be deployed with minor upgrades in infrastructure.

Another example is the use of automation systems, such as cleaning robots, drones and automated guided vehicles (AGVs) to take over certain tasks. AGVs, which are increasingly used in the healthcare and industrial sectors, are now being deployed in commercial and mixed-use office developments. Automation will be part of the solution for deliveries, security and additional cleaning requirements. Solutions such as cleaning robots fitted with ultraviolet (UV) lights to disinfect rooms and surfaces are now coming to the market.

### Wellness/User Experience (UX)
"How do I ensure my tenants are incentivised to come back to work?"

According to CNN, "Google will let employees work from home until at least July 2021" (Fung 2020). While some employees are returning to work, global occupancy levels are still at record lows; headlines like these show that tenants are seriously considering their future requirements for office space. With working from home expected to increase from 20 to 27 percent on average (Boland et al. 2020), companies are scrutinising their office footprint requirements and considering options such as downsizing, decentralising and even fully remote working. Long-term leases have shielded asset owners in the short-term, but there are strong signs of disruption and dynamic change soon.

Owners and operators are searching for strategies to ensure their properties can adapt to these changing tenant requirements and be competitive.

"How do I ensure my tenants are incentivised to come back to work?"
187 people surveyed from 13 office departments



| | |
|---|---|
| 20.8% | Employee Restaurant |
| 20.0% | Gym |
| 18.0% | Business Centre |
| 11.2% | Work Daycare |
| 9.2% | Sleep Room |
| 7.5% | Learning Centre |
| 6.7% | Library |
| 2.6% | Female Employee Lounge |
| 2.4% | Health Room |
| 1.2% | Other |
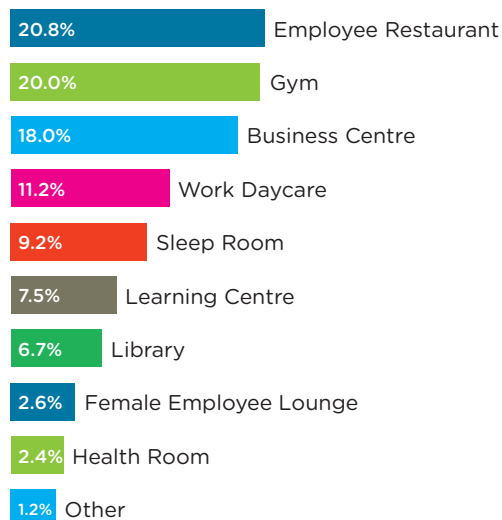
Figure 5. Tenant surveys are an important tool in the overall kit, as they not only reveal critical needs and gaps; they also help to build a better relationship with the owner during uncertain times.

The signs are that tenants will be looking for more than just a desk space to lure their employees back to work, and the authors foresee an acceleration in the trend towards a focus on user experience (UX) and health and wellness in the workplace.

Before the COVID outbreak, the built environment was beginning to implement more user-oriented design approaches, with a particular focus on wellness. This focus led to the rise of certification schemes such as WELL, which "aim to advance health by setting performance standards for design interventions, operational protocols and policies and a commitment to fostering a culture of health and wellness." (International Well Building Institute, n.d.).

The importance of wellness in the post- pandemic workplace has increased significantly, with a renewed focus on enhancing personal health to attract people back to their buildings. A study in the US reported that 61 percent of employees feel uncomfortable returning to the workplace: "Most employees aren't ready to take

chances and expect significant precautions before they'll feel comfortable returning to the workplace" (Qualtrics XM 2020).

The surge in wellness-based design was not only driven by companies, but also by individual building users, such as employees who have increasingly high expectations regarding their work environment.

"The key component of the UX design process is the ability for owner/operators to gather real-time data on tenant requirements, and the ability to quickly adapt the asset to those requirements."

Tech companies became famous for their employee-focused workplaces, featuring foosball tables, baristas, and diverse work environments. By applying UX techniques from product development, they saw the potential for enhancing employee

performance through people-focused user experience.

UX is all around us. When we use services such as Netflix or Facebook, our experiences are designed and curated to reflect the brand and the company values. While this approach is widespread in technology, it was not applied to buildings and architecture until recently. The UX design process can be a powerful tool to ensure real estate effectively meets tenant requirements.

The key component of the UX design process is the ability for owner/operators to gather real-time data on tenant requirements, and the ability to quickly adapt the asset to those requirements. Data gathering can be performed through existing building systems and sensors to report on parameters such as temperature, light levels and occupancy, which are some of the key indicators of wellness. Even more valuable are direct tenant surveys that provide insights into requirements and expectations for workspaces (see Figure 5). The future may see the owner/tenant relationship evolve into a more of constant dialogue and partnership, rather than a static conversation of requirements at lease time.

For example, at the Norwegian shipping and property company Smedvig/Veni, "We leverage technology to provide insight into our building user requirements. By utilising sensor data from our building system and our in-house mobile applications, we can customise services directly for our clients and help them make healthy choices through information and education. In return, we see an increase in value of our assets in a difficult market, due to their ability to prepare for and respond to global challenges like the ones we're experiencing now" (Heather Bergsland, Veni).

The final step is to develop multi-disciplinary responses to the above information: How can we define the safe capacity of the office before an employee decides to go to work? How can we implement analytics to help us maintain social distancing throughout the workday? How should we modify our spaces to create high-value interactions and enhanced productivity?

Planning and implementing responses to the post-pandemic workplace ensures that our interventions are appropriate to our businesses and people. Additionally, it allows employees to feel empowered through transparency and collaboration, in times of uncertainty. Addressing the concerns in this way will not only get our businesses back to work, but will allow us to focus and be

**1 Check-In**
Action: Check-in to the building app
Thought: "I want advance check-in."
Technology: Mobile Check-In
Space: Off-site

**2 Seamless Access**
Action: Get through security turnstile
Thought: "I want contactless access."
Technology: Facial Recognition Turnstiles
Space: Hotel Lobby

**3 Call a Lift**
Action: Call a lift
Thought: "I need to get to the office quickly."
Technology: Mobile Liftcall
Space: Lift Hall

**4 Waiting for Lift**
Action: Waiting for lift
Thought: "Which lift should I take?"
Technology: Manage Queue Zone
Space: Lift Hall

**5 Lift Journey**
Action: Take lift to office
Thought: "I want some clean air."
Technology: Fresh Air Supply
Space: Lift

**6 Working**
Action: Group Discussion
Thought: "Work together at distance."
Technology: Screen/Barrier
Space: Collaborative Space

**7 Meeting**
Action: Meeting with colleague
Thought: "I want a productive meeting."
Technology: Holopresence Meeting
Space: Meeting Room

**8 Coffee Break**
Action: Brew coffee
Thought: "I want a cup of coffee."
Technology: Mobile Office Amenities
Space: Office Pantry



Figure 6. A focus on user experience (UX), not only in architectural space, but in the entire end-to-end "journey" of daily interactions with the physical environment, will be a key driver in bringing occupiers back to work safely and productively.

## COST

**Capital Expenditure**

**Operating Expense**

**Refresh**

**ICT**

## BENEFITS (tangible)

**Workforce Reduction**

**Energy Savings**

**Energy Production**

**ICT**

**Leasing**

**Tax Incentives**

## BENEFITS (intangble)

**Comfort**

**Productivity**

**Engagement**

**Security**

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### Space Reconfiguration

TOTAL USD 150,000

USD 100,000

Branding

Space Efficiency

Staff Productivity

CAPEX&OPEX | BENEFITS

### Building System Optimisation

TOTAL USD 760,000

USD 100,000

Branding

Energy Savings

CAPEX&OPEX | BENEFITS

### On-Demand Services

TOTAL USD 110,000

USD 76,000

Branding

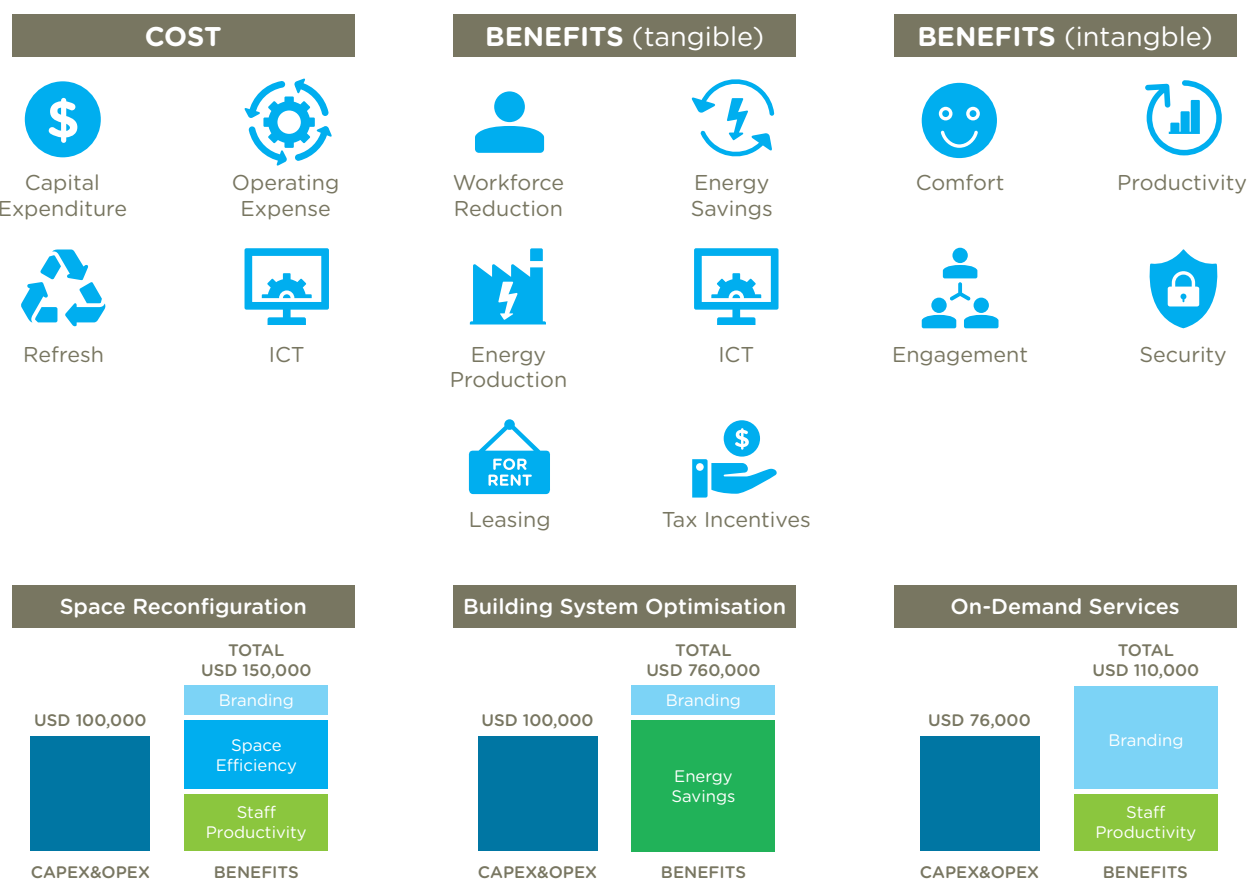Staff Productivity

CAPEX&OPEX | BENEFITS

Figure 7. A sample cost/benefit analysis (CBA) as applied to the post-pandemic workplace.

productive once we are there. From this, a new user journey ensues (see Figure 6).

### Investment

"How do I make informed investment decisions for long-term resilience and adaptability?"

We are now moving from the defensive stage of the pandemic response to a more forward-looking position. While in the near-term there will be periods of uncertainty and accelerated change, with large sums of free capital in the market and record low interest rates, it seems now would be the right time to invest in future resilience and adaptability. "One example is the hospitality industry, significantly impacted by the reduction in global travel. Some hotels are promoting their restaurants, bars and amenity spaces for co-working, which delivers hotel-quality human experiences

and services. To return to the workplace, health, safety and wellness are the most important elements. Businesses need to motivate employees back to their place of work, where they are entertained in an events-driven social environment and collaborative spaces redesigned to suit their needs" (Jenny Soo, Head of Workplace Experience, APAC, JLL).

Owners and operators are aware of the need to invest to address the new normal, but with high levels of ongoing uncertainty, they need a framework for informed decision-making. As part of the New Solutions Toolkit, we utilise a detailed cost/benefit analysis (CBA) to illustrate proposals and how they align with the specific development's business case (see Figure 7). CBA is a quantitative and qualitative approach that is widely used as part of the decision-making

process for government spending. The goal of the CBA is measuring the costs and benefits of proposed intervention against a baseline scenario in the development. This gives the owner/operator clarity about which options to pursue.

In the CBA methodology, there are two kinds of cost: capital expenditure (CAPEX) and operating expenditure (OPEX). CAPEX is the initial investment for the proposed intervention, which could include fit-out of an existing space or new hardware, installation and testing. OPEX represents the ongoing costs such as licensing, maintenance or replacement during the design life of the proposed solution.

As with costs, the CBA categorises benefits as tangible and non-tangible. Tangible benefits are those that can be directly quantified, such as

workforce reduction or energy savings. Intangible benefits are those that require indirect methods of quantification, such as security or user experience. In the post- pandemic world, intangible benefits have moved higher up the value chain. A good example is the new focus on wellness and user experience for commercial office space, with operators and employers racing to demonstrate their premises are safe and provide valuable interactions.

In addition to the CBA, owners and operators need real-time information, infrastructure and governance to react quickly to change. In this short-term period of uncertainty, asset owners should consider investments that provide the right kinds of infrastructure and upskilled workforce and continue to collect and mine the data needed to optimise performance.

## Future Normal

The events of 2020 have shown that many standards of today's urbanism are vulnerable and ripe for disruption. This has led to the rapid acceleration of several global trends and the erosion of confidence in some practices that were once considered as fixed constants.

The "New Solutions Toolkit" provides a framework to evaluate the effects of the rapidly changing conditions and presents practical solutions for the built environment in the search for a return to efficient and productive operations. The key learning

from this is the need for owners/operators to build resilience and flexibility into developments that allow for the constant evolution that will be the "Future Normal."

Resilience in the Future Normal will mean real-time access to data of tenants and user requirements, and operational governance that allows adaptation to deliver personal wellness and experiential spaces that will drive the market. The economic conditions of 2020 are also unprecedented, with a significant downturn in activity coupled with huge amounts of capital and low-interest rates in key markets. This points to a huge opportunity for ambitious owners/operators who make the right investments and drive the new trends that will define the Future Normal.

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