ARCADIS | Design & Consultancy for natural and built assets

Australia Edition

RETHINKING URBAN RESILIENCE

Cities
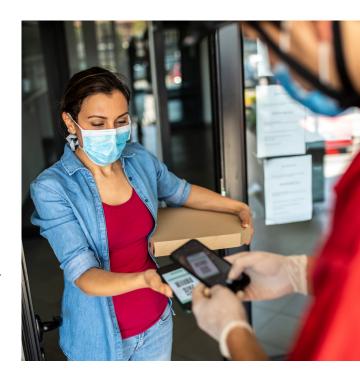
RESILIENCE TO RECOVERY

Foreword:

The COVID-19 pandemic has shone a spotlight on the resilience on us as people and on our cities. Our ability to overcome these shocks and stresses, to cope with uncertainty and be prepared for whatever challenges the future brings, has been sorely tested.

Australian cities and communities have not been spared. After an initial national lockdown helped curtail pandemic cases, the very real issue of second or even third waves remain as Melbourne's extended fight against the virus has shown.

The immediate response to the crisis has been to protect health and wellbeing, while keeping businesses and essential services functioning. But responding to the long term impact on our cities and economy will mean redefining resilience to include two essential qualities: **Robustness and Adaptability**.

Robust systems–-human, physical, digital–- that are strong enough to withstand whatever pressures are thrown at them is a priority. We also need to be **Adaptable** enough to modify and change those systems over time to boost resilience, respond to change and incorporate new knowledge or technologies.

We all know how the pandemic has impacted the people and communities around us, and we suspect many of the old ways of working, mobility and living have changed for good. At Arcadis that means we'll work more remotely and collaborate digitally where possible while continuing to provide sustainable outcomes for our clients around the world.

Stephen Taylor

Australian Cities Director

Jacqui Banks

Melbourne City Executive

INTRODUCTION

The world has had warnings about coronavirus type pandemics for some time, but Covid-19 still managed to hit harder than expected, with devastating impacts on most of the world's cities. Cities are vital to our resilience, with well over 50% of the world's population live in them and they account for over 80% of global GDP.

Most of the world's cities have already invested heavily to enhance their resilience against a whole range of risks, most recently around climate change events like extreme weather and rising sea levels. Until now however, the potentially devastating impact of a pandemic had not played a large enough role in how we plan, design, build and use urban spaces.

RESILIENCE AND RISK

In Arcadis's 2019 report, The business case for resilience, we recommended financial modelling tools and resilient index frameworks to articulate the benefits of resilience planning, while demonstrating the potential returns on investment. Given the impact of the pandemic, the case for boosting resilience spending is clearer than ever.

Importantly the pandemic has exposed the limitations of framing resilience solely around risk-management. The World Economic Forum's (WEF) Global Risks Report 2020 issued at the start of the year surveyed an "extensive network of business, government, civil society and thought leaders," to produce its Global Risks Landscape. A global pandemic did not even make their list of the top ten most likely risks in 2020.

THE QUALITIES OF RESILIENCE

Analyzing and mitigating risks is important, but a better way to increase urban resilience focuses on strengths and qualities–that is, what makes us more resilient no matter the crisis.

Resilience comes from identifying all the critical aspects of cities—people, communities, systems and organisations—that absolutely need to function no matter what. Ensuring they're **Robust** and **Adaptable** enough to withstand any stress while also evolving to meet new circumstances requires constant monitoring and analysis to avoid costly disruptions.

Cities have been particularly hard-hit by the virus because the qualities that make them so vibrant–people and ideas converged in social, creative and economic hubs—also make them susceptible to it.

It is also obvious that some of the most vulnerable and lowest paid inhabitants in cities were also the same people on the frontline of the pandemic in healthcare or essential services. City planners have a responsibility to plan for more diverse and equitable communities by putting urban resilience at the centre of short and longer term recovery initiatives. This means enhancing the resilience of the most vulnerable parts of the system, because these vulnerable parts will impact the entire system.

This kind of thinking is not new. But the crucial lesson we're learning from COVID-19 is that addressing inequality is vital.

The COVID-19 experience has enriched our thinking about urban resilience in the way that it has amplified the need for a reprioritization our efforts to improve

COMMUNITY DESIGN

The COVID-19 pandemic recovery is a call to action to place communities at the centre of urban resilience. All designs should be made with the end users in mind, with a participatory approach that allows communities to actively express their desires, wishes and functionalities needed for their resilient recovery.

We should go beyond just informing or consulting the community by truly engaging them in the journey of development. Let the communities be the diverse voice of the city and spark innovative thinking to come up with the most beneficial and resilient urban development to improve quality of life for all.

As well as the imperative to create equitable, diverse and inclusive cities in post-pandemic resilience efforts, there are a number of additional areas that should be explored.

The COVID-19 experience has enriched our thinking about urban resilience in the way that it has amplified the need for a reprioritization our efforts to improve the quality of life for all citizens. As well as the imperative to create equitable, diverse and inclusive cities in post-pandemic resilience efforts, there are a number of additional areas that should be explored.

BUILDING THE BUSINESS CASE

One of the problems of planning for resilient urban developments is that the business case is often unclear—what exactly are the costs and benefits, and how are they distributed over different stakeholders? There are a number of frameworks and digital tools that can be used to help understand the full range of economic and social benefits of investing in resilience over the short, medium and long-term. These tools, which are being updated to include pandemic responses and public health resilience, show there are now additional social benefits in resilience that pay off even more than anticipated if they're done well.

ROBUST AND ADAPTABLE URBAN PLANNING

Cities need to champion the idea of creating robust and adaptable urban spaces so they're functional even during severe shocks. For example, in Australian cities temporary compartmentalisation of urban spaces helped to curtail the spread of the virus and it's clear going forward that planning public spaces to reduce congestion is key.

Creating more green spaces is also good for cities. Apart from providing health benefits to residents, they improve air quality, cut noise pollution, combat urban heat island effects while making cities more flood resilient by minimizing water run-off, serving as locations for urban water storage and boosting biodiversity.

COVID-19 also showed us the importance of creating public spaces closer to our homes for use during a lockdown for both mental and physical wellbeing. Restaurants and bars—as well as other tourist and recreational services—may also require more space for their terraces and other facilities.

UN-HABITAT – SHELTER PROGRAM

Arcadis and UN-Habitat contribute to one of the most urgent challenges in the world: sustainable and resilient urbanization. UN-Habitat's mission is to promote socially and environmentally sustainable towns and cities by improving the quality of life of citizens around the world. Arcadis supports UN-Habitat in facing these urban challenges by providing pro bono expertise through the Shelter Program, a global partnership that makes a real difference.

In light of COVID-19 Arcadis has supported UN-Habitat by setting up a Rapid Response Help Desk for UN-Habitat staff and UN-Habitat partners, to provide instant technical advice on COVID-19-related issues in the areas of water, environment, buildings and mobility. Arcadis has assisted with creating a checklist for the conversion of hotels and other buildings to medical facilities. Lastly, Arcadis is combining all valuable lessons learned from this crisis to help city administrations to be better prepared in the future, creating a set of recommendations and guidelines for pandemic resilient cities.

RETHINKING BUSINESS DISTRICTS

The pandemic also raises questions about the shape, function and value of city centres. For example, companies and organisations have already begun rethinking their need for expensive, city centre office space as work is rapidly redefined by remote and telework arrangements. Fewer people working in cities has direct impacts for urban transit services as well as the retail and hospitality sectors.

More diverse, equitable city centres will be needed so that critical workers like nurses, bus drivers, and sanitation workers can live closer to where they work. Opportunities like transforming offices into public or mixed housing can create more varied use of buildings to both improve the liveability of cities and boost occupancy and/or any potential decline in real-estate values.

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OPTIONEERING USING THE BANKABLE RESILIENCE TOOL (BART)

Optioneering with BaRT is a strategic benefit-based approach which enriches the current risk-based approach in spatial planning. BaRT is characterized by a multi-stakeholder approach––including the communities and their leadership, NGO's, city council, health sector, developers, major employers––to identify together the opportunities that create return on investment.

The Arcadis Bankable Resilience Tool (BaRT) is a cost-benefit and multi-criteria analysis

tool that we use in the co-creation sessions to support cities and developers in evaluating their resilience options when planning an urban (re)development project. We use BaRT to analyse investment opportunities and prove—through financial modelling—that there is a business case for making a resilience investment in a city's transformation.

Moreover, with BaRT we allocate costs and benefits to stakeholders to start the conversation about possible financial arrangements to deliver resilience. BaRT shows the additional value of resilience measures, highlights opportunities to capture the value

of related developments, and outlines possible financial arrangements to deliver resilience.

A post-pandemic world that more fully embraces remote working, internet shopping and telemedicine could see a significant reduction in commuter traffic in cities.

ENHANCING MICRO-MOBILITY

Initiatives to stimulate new & emerging forms of urban mobility will be necessary to counter the return of single owner cars as as a safer way to travel during the pandemic. An overall shift away from mass transportation back to private vehicles will hamper the resilience and sustainability of urban environments long term.

A post-pandemic world that more fully embraces remote working, internet shopping and telemedicine could see a significant reduction in commuter traffic in cities. This boosts city resilience by improving air quality, reducing traffic accidents, cutting traffic and curtailing required parking space to potentially free up space for affordable housing or parks.

To meet the new demand for pedestrian spaces and last mile micro mobility—including e-bikes, scooters, ride hailing services––we need to create blue-green corridors that mix bike lanes and pathways with green spaces, pedestrian zones and water infrastructure to help revitalise urban spaces.

New modes of transport in partnership with urban technologies like software, sensors, cloud computing and Internet of Things enable us to monitor and analyse data to create smarter, more resilient transportation systems, public spaces and cities that can quickly respond using digital strategies and information.

REBUILD BY DESIGN: "BIG U"

Community engagement is nothing new for Arcadis. In response to Hurricane Sandy, the US Department of Housing and Urban Development (HUD) launched a competition, Rebuild by Design, to bring together the best and brightest ideas to protect the Northeast United States from the next big storm. Along with the Bjarke Ingels Group (BIG), Arcadis and partners were the selected to design resilient urban coastal infrastructure in New York City. This was a state-of-the-art participatory approach to enhance interactive and pro-active stakeholder engagement throughout the recovery process, . involving the development – together with the local stakeholders – of a landscaped protective alignment that combines architectural floodwalls, embankments, elevated berms and park space, to protect and enhance local communities, businesses, and the public transport backbone. The East Side Coastal Resiliency project is the first step to realizing the vision of the Big U and a resilient New York City. Arcadis and partners developed feasibility and conceptual design reports to provide flood protection and social infrastructure for 200,000 residents, and 21,000 business in the area. A range of multifunctional resiliency solutions integrated with neighborhood and community amenities improve community access and expand enjoyment of parks and recreational spaces.

REMEMBER SUSTAINABILITY

Sustainability principles must not be forgotten in the post-pandemic world. The urban spaces and cities that do thrive will need to be better prepared for a future pandemic as well as climate change, requiring not only an adaptable approach, but mitigation too.

There should be a renewed focus on new buildings alongside retrofitting older buildings with sustainability features such as green façades, energy-efficient power systems, and monitoring and evaluation systems which help critical systems to adapt to changing circumstances as efficiently as possible.

The construction industry will also need to improve its own resilience by increasing productivity and efficiency, embracing the use of sustainable materials, tackling resource consumption, reducing carbon footprints, and design using cradle to cradle principles. It should also accelerate the adoption of digital tools, prefabrication and off-site construction techniques.

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FRAMING THE RESILIENCE DISCUSSION

It is clear that urban systems need to act more quickly to solve the most pressing challenges raised by the pandemic. In our work with private and public sector clients around the world, we focus on the following five means of enhancing resilience:

PEOPLE
Societies, cities, communities, and organizations are only as resilient as their people. After the pandemic, we must focus on improving the health and wellbeing of the most vulnerable, and enhance the resilience of wherever they live, work or play.

DESIGN
Resilience can be enhanced by embracing new resilience-conscious ways of designing and retrofitting buildings, facilities, and urban spaces in a post-pandemic world.

PLANNING
Resilience thinking must be placed at the heart of business continuity planning. Collaboration must also be embraced, between communities, organizations, industry sectors and supply chains.

DIGITAL
Digital tools and platforms are essential for gathering and analyzing data which can inform smart decisions that can ensure business continuity and lead to competitive advantage.

SUSTAINABILITY
Resilience and sustainability go hand-in-hand. By implementing projects that improve sustainability performance, reducing resource consumption and protecting the environment, organizations enhance long-term resilience.

People

Creating equitable, diverse and inclusive cities should be central to enhancing urban resilience.

Define and promote policies that proactively tackle inequality, injustice and promote diversity within society. As an open and inclusive organization, Arcadis believes there should never be a place for wide-ranging and systematic inequality – in any form – and we draw strength from our many diverse cultures, backgrounds and experiences.

Strengthen collaborative relationships with all of the key stakeholders within communities that can work together to achieve resilience – health services, critical civil infrastructure, public services, governance, including at street or neighborhood level. Resilience within the context of a city relies upon a detailed understanding of the human relationships and the interconnected systems that underpin society and working to make them strong.

Cities should ensure that services from public utilities are undisrupted, affordable and available to all, including broadband internet services which have proven to be essential to many aspects of daily life, including telemedicine, remote working, commerce and social connections. It means supporting the roles of critical workers, too. Bring the human element into the design process of cities for greater community and societal resilience.

Focus investments on making public health more robust and adaptable. After the immediate COVID-19 crisis is over, cities need to prioritize the resilience of public health, and the services and infrastructure that underpin this. At a policy level, this means promoting steps to reduce the prevalence of underlying health conditions, building societal resilience through public health education, safe public transport, air quality improvements and urban green spaces

Design

City spaces need to be re-thought, with investments re-prioritized around solutions that will enhance the robustness and adaptability of city spaces, making them more supportive of sustainable communities.

Cities need to invest in creating city-wide more green and blue spaces to bolster community resilience. This trend had already begun, but COVID-19 has highlighted the need for more. Parks and waterways will improve biodiversity, water storage and run-off, reduce acoustic impacts, improve air quality, and mitigate urban heat island effects. They also help communities to be more adaptable and mentally resilient, by providing essential outdoor space. Community green and blue spaces add value, not only to quality of life, but could also add to the value of real estate in the neighborhood. Also adding green roofs and greening buildings along their facades and on balconies can contribute to better livability and more ecosystems value.

Cities need to invest in making transport systems more diverse, greener, smarter, and more supportive of livable communities. This will enhance resilience and sustainability, with a greater emphasis on micro-mobility. Smart tools will guide car use, cycle-ways and public transport systems, ensuring that public transport usage is optimally distributed for the individual and the collective. Public health benefits can be unlocked by encouraging modal shifts in transport – providing pedestrians and cyclists with more space, creating a new style of public transport.

Critically reflect on the role that transport hubs and commercial business districts could have in post-pandemic cities. These hubs may need to be adapted to suit the changing needs of the future, as post-pandemic working practices shift to accommodate greater home working and remote collaboration. Commercial business districts could become more mixed-use, with a range of accommodation types.

Invest in retrofitting, upgrading or constructing adaptable buildings to better serve the needs of the time. This includes more flexibility in space use, off-site modular construction, more efficient use of natural resources and better design to enable post-pandemic workplace trends.

Planning

A robust and adaptable approach will enhance resilience.

Be prepared for the unknown and the unexpected. New York experienced three, recent, major resilience challenges: 9/11, Hurricane Sandy, and COVID-19. In all three experiences, the city had been preparing for the previous event, but thinking they were prepared for the future. After each event, resilience was improved, but their experience shows the importance of not solely relying on risk assessment planning. Under this framework, 'known risks' tend to be looked for and mitigated against. The next disaster may well be very different.

Understand the critical systems within urban environments that will enable cities to adapt to the next crisis. Resilience will come from being both robust and adaptable, it is unfeasible to be 100% resilient against any eventuality, so resilience is a balancing act between sufficient robustness, and additional adaptability. Resilience at the urban level will come from strengthened collaboration between all stakeholders, and adaptable planning tools such as scenario planning/adaptation pathways/ learning cycles will help to gain a better understanding of all the factors needed to develop a robust and adaptable resilience strategy.

Resilience can only be enhanced when cities move from the strategy phase to the implementation phase. Many cities around the world have committed to resilience, but often plans are stuck in the strategy phase and the step to implementation has not been taken. COVID-19 has shown the importance of actual implementation. After a crisis there is usually a short period of time where there is an opportunity to focus on making critical systems more robust and adaptable, which means working with organizations that also know how to implement the resulting strategy – architectural and engineering design, master-planning, business planning, program management, access to public and private finance.

Digital

Digitalization – spurred on by COVID-19 – needs to be accelerated to fully capture the benefits of data, support wider community participation, and enable new business models. Digital security must also be invested in, to reduce system vulnerabilities.

Digital solutions can significantly enhance the resilience of cities. Learning from data can make a city more resilient, and cities should broaden the scope of their consultation on digital initiatives to include citizens too, for effective engagement with communities. Smart utilities will continuously learn and adapt by using data from wastewater and data from mobility to feed into a continuous learning cycle. Sensors will help throughout, identifying where heat stresses are occurring in order to develop cooler cities, or enhance public transportation systems. Smart tools can inform action to help stop the spread of diseases. For example, sensors can monitor and detect viruses in wastewater, which could lead to faster detection of virus outbreaks.

Be transparent with the data that your smart infrastructure collects as data will significantly inform resilience plans. Digitalization of physical infrastructure – smart, interconnected infrastructure – is transformative for urban resilience. Owners and operators of significant public infrastructure should harness digital tools to make their asset management – in operation and maintenance – more robust and adaptable to future unknown or unexpected events.

Within the buildings sector, digital twins are beginning to gain significant ground. By using BIM and its associated technologies, a true picture of the relationship that buildings have with the environment can be generated, both in terms of how the building impacts the environment, and how it responds to changing environmental conditions.

Reclassify broadband internet as a critical utility. Internet services underpin so many aspects of resilience within cities that broadband internet services should be repositioned as a critical service, offered universally. Digitalization can enable significant shifts in how cities function (remote working changing commuter patterns and workspace utilizations, reducing environmental impact, and expanding business districts into mixed use communities).

Invest in data security too. Digital infrastructure is also a resilience threat. Failures in technologies and processes, cyber-attacks and power outages can lead to system vulnerabilities. There are well-trodden paths to ensure digital resilience which should be taken.

Sustainability

As we enter the post-pandemic phase, it is crucial to use this short window of opportunity to accelerate sustainability and resilience in urban areas.

Avoid focusing solely on economic recovery and resilience at the expense of sustainability. Use the acceleration of building activities (repurposing existing assets, transforming commercial business districts) post-pandemic to embrace sustainable construction.

Embrace nature-based solutions that will make cities more resilient, as they are more robust and less vulnerable. For example, cities like Rotterdam and New York combine flood protection measures with other urban functions such as parking, transport, recreation, and tourism, as well as natural functions such as ecosystem-based functions.

Cities have now an opportunity to recover from COVID19 in a more sustainable and resilient way. Invest in carbon neutral projects and accelerate the pace of change in the transition to clean energy. The world is in a sustainability transition period, where it is an increasing imperative to transition from fossil fuels to alternative sources. Being more sustainable (accelerating the energy transition, becoming more self-sufficient with local food production, but also less dependent on water supplies and fossil fuels) can help in making our cities more resilient to shocks and stresses.

CALLISONRTKL Case Study:
Red River Redevelopment
Hanoi, Vietnam

Using urban flood resilience as a catalyst for investment, Arcadis worked alongside CallisonRTKL (CRTKL), a global architecture, planning and design practice, to create an urban waterfront masterplan for the Red River in Hanoi that paves the way for socio- economic growth, high-level job creation, housing investment and enhanced social mobility.

Charged with limiting the flood risks for Hanoi while creating a sustainable and resilient urban development along the river, Arcadis and CRTKL undertook the strategic assessment of three potential flood protection options:

1. A new conventional dike;

2. The combination of a new dike and an improvement of the existing dikes;

3. A riverbank stabilization option, designed for flooding, without a dike.

The third option was favoured for its ability to create a spacious and eco-friendly river landscape and an attractive urban setting with flood-resilient housing, boulevards, parks, tourist, and recreation facilities serviced by a public transport system.

Designed to emulate the success of river cities such as New York, Shanghai, London and Singapore, the plans for Red River's 11,000+ hectares of riverside protect Hanoi from a 500-year flood event and also:

• Maximize land development opportunities

• Maximize property values

• Attract investment and a diverse population

• Create higher salary jobs

• Generate additional tax revenues for the city

• Increase contribution to the nation's GDP

The project team also expanded the scope of work with consideration given to the 'squatters' that have illegally inhabited the flood plains of the Red River for many years and how they too could be protected with improved flood hazard safety, community services and infrastructure, housing stock, education and training, and viable industry connections with the larger Hanoi metropolitan area.

The resulting strategies offer a solution for city and community resilience, with funding for this project currently being studied by local, national, and foreign direct investment.

For further insight into this project, contact:

Dianne Legge
CRTKL Vice President
E: diane.legge@crtkl.com

CONCLUSION

As we emerge from the pandemic, it is crucial to place resilience at the heart of all urban planning decisions. Post-COVID-19 resilience will come from focusing on the systems, assets or approaches that make a city and its communities stronger, no matter what. Robustness is a desirable aspect of resilience, but it cannot be pursued at-all-costs. Absolute robustness is ultimately unaffordable—and probably unobtainable—and may also not prepare cities for the unthinkable. But robustness in partnership with adaptability means systems and assets will not only be better capable of withstanding major stressors but even unexpected shocks when they happen. Changes and adjustments can then be made so that the critical parts of the system can recover and still function.

CITIES SHOULD

• Take a systematic approach to learning from the pandemic experience. Use adaptive thinking— embracing a continuous learning cycle—to reflect and learn from what worked well, what went wrong, and build in learning to avoid being surprised in the future. Smart and adaptive thinking—making full use of digital technologies—will enable planning for a better and more resilient future. There is a short window of opportunity that needs to be taken.

• Cities should realise that resilience can pay off. In our white paper of 2019, The business case for resilience, we set how using resilience index and financial risk tools can see returns for investment in long-term resilience. The experience of COVID-19 shows that investing in resilience is crucial and justifies more investment in the future.

• Cities should act on lessons learned from the crisis. Normalcy will eventually return, but COVID-19 is a wake-up call for an investment in the redesign of our urban spaces. By learning from our experiences and taking adaptive measures to ensure the long-term quality of life in our cities. Investing in a robust and adaptable system – that is feasible and achievable – generates revenues no matter what or when the next shock will be.

About Arcadis

Arcadis is the leading global Design & Consultancy firm for natural and built assets. Applying our deep market sector insights and collective design, consultancy, engineering, project and management services we work in partnership with our clients to deliver exceptional and sustainable outcomes throughout the lifecycle of their natural and built assets. We are 27,000 people, active in over 70 countries that generate €3.3 billion in revenues. We support UN-Habitat with knowledge and expertise to improve the quality of life in rapidly growing cities around the world.

Contact us

Stephen Taylor
Australian Cities Director

E stephen.taylor@arcadis.com

Jacqui Banks
Melbourne City Executive

E jacqui.banks@arcadis.com

Piet Dircke
Global Leader, Resilience & Water Management

E piet.dircke@arcadis.com

John Batten
Global Cities Director

E john.batten@arcadis.com

Find out more:

www.arcadis.com

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