



Q_smart

Healthy, Connected and Flexible Quarantine



*Proposal for a New Long-term Quarantine Model
Utilising Modular Construction and the Internet
of Things*

SIEMENS

**building
4.0** crc



Overview

Q_smart proposes a technology-enabled building and service delivery quarantine solution: a comprehensive, integrated system comprising a suite of processes, tools and products that are highly flexible and scalable for use in different locations, nationally and globally. The building solutions are factory-made and can be assembled to suit a range of site conditions and requirements. The structures are easily dissembled and can be relocated and repurposed for other applications (bushfire relief or affordable housing for example).

This system proposes that the conventional bricks and mortar, or mining camp, approach to the delivery of quarantine facilities does not take into account the significant advances in building technology and management, including the use of Internet of Things (IoT) devices. Additionally, new building materials, processes and techniques have enabled purpose-built construction in shorter timeframes, to a higher quality and with more flexibility than ever before. The Q_smart system will harness these advances for the benefit of all stakeholders while boosting the national manufacturing and construction industry and developing an exportable solution.

Q_smart places the health and wellbeing of quarantine occupants at its core. Occupants will be accommodated safely in purpose-built facilities that incorporate the latest knowledge in viral transmission (airborne and surface transmission). Residents will not only be connected to both the external environment through access to fresh air and the social and civic infrastructure provided, but also with family, friends and healthcare providers through state-of-the-art digital technologies. Finally, Q_smart is highly flexible, accommodating a variety of sites and locations, along with a wide range of family sizes and types.



The System

In Australia, the principal ongoing risk of infection is currently through travellers arriving by air. Therefore, the accompanying images illustrate the proposed facilities located adjacent to airports, minimising the number of touch points between travellers, the external environment and quarantine accommodation. This further reduces the risk to service staff and health professionals. Depending on the available land, the systems can be spread horizontally, stacked vertically, or a mixture of both.

Upon disembarkation, arriving travellers would collect an identification tag and move through a touchless system to their nearby accommodation. Unlike the common spaces and corridors of hotels, Q_smart is arranged as a series of isolated airlocks, which can be sterilised through technologies such as UV light emitters and high-volume refresh air handling systems.

Sensing infrastructure and automation provides not only live and historical tracking functionality, but also the capacity for real-time intervention across all building systems, including air and water safety, and managing and measuring building performance to provide a safe and secure environment for occupants and staff. As the buildings are capable of monitoring themselves and their management systems are capable of autonomous learning, this allows prevention to occur through prediction.

Ventilation systems will be fitted with air cleaning and sterilisation systems and low transmission materials will be used for high-contact surfaces. Wearables, telehealth facilities and wastewater monitoring will be used to provide early warning diagnostics, available to management in real-time. The introduction of building automation systems will provide the critical cleaning and goods delivery services. Automating these services will reduce staff traffic and potential contamination points, and also reduce significant, ongoing operational costs.



The Q_smart building system uses a kit-of-parts approach. Buildings are organised around a central, structural services core. This core holds the building services, the technology hub, and is the structural “backbone” of the building, enabling modules to be one-storey or stacked to eight storeys where space is limited. These modules are delivered complete to site from the factory. Additional rooms can be “plugged” in, delivering unrivalled building flexibility and re-use for a range of applications. When stacked, each core module contains an airlock, accessible from a vertical circulation core (lift and stairs).

Key Features of Smart Quarantine

Smart Building Technologies

- Automated goods delivery system (dumb waiters direct to rooms)
- Motion detection systems for UV light cleaning
- HVAC air cleaning and UV sterilisation
- Automated lighting systems
- Digital communication and connectivity
- High-definition telehealth
- Facial and location tracking for contact tracing
- Waste-water monitoring for virus fragments
- State-of-the-art sensing infrastructure coupled with Machine Learning (motion, infrared, pattern recognition)

Building Systems & Materials

- High performance acoustics
- Low transmission materials
- Pressurised building systems
- Smart materials and hygienic coatings
- Rapid deployment
- Kit-of-part approach for flexible layouts
- Robust modules allow for easy disassembly for multiple episodes of relocation and reuse
- High quality structure and finishes

Health and Wellbeing Benefits

- Wearables linked to central control system providing real time diagnostics
- Telehealth facilities
- Safe access to fresh air and external spaces
- In-room gym and exercise features
- Materials and design features that provide low-transmission risk and assist mental health support

Staffing and Servicing

- No requirement for face-to-face interaction except for special needs residents
- Staff located on-site in quality accommodation, reducing daily risk from commuting

Smart Design

- Flexible layouts for range of sites and locations (spread horizontally or stacked vertically)
- Optional mobile hospital clinics on-site for low-intensity patients
- Airlocks instead of common areas, eliminate corridors and group rooms
- Providing a variety of suite types depending on residents (office, relaxation, family, etc.)

Sustainability and Re-Use

- Sustainable, renewable materials
- Buildings can be disassembled and re-used for a range of applications and any crisis response (bushfire, natural disaster)
- Smart fixture control to minimise operational costs (electricity, water, HVAC)

Security

- 24-hour video surveillance and monitoring
- Potential to be located “air-side” effectively borrowing additional airport security



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319 320
EMB 190
170 175

737 321
CRJ - ALL

The Collaboration



Siemens

Siemens focuses on electrification, automation and digitalization. As one of the world's largest producers of energy-efficient, resource-saving technologies, Siemens is a leading supplier of intelligent infrastructure for buildings, automation and digitalization for industry, and smart mobility solutions for rail and road transport.

Siemens' healthcare division, the Siemens Healthineers, aims to enable healthcare providers to increase value by empowering them on their journey towards expanding precision medicine, transforming care delivery, and improving patient experience, all enabled by digitalizing healthcare. As a leading medical technology company with over 120 years of experience and 18,500 patents globally, Siemens has over 50,000 employees in more than 70 countries and continues to innovate and shape the future of healthcare.

<https://new.siemens.com/au/en.html>



Building 4.0 CRC

Building 4.0 CRC is a group of leading research, industry and government organisations who have come together to advance the building industry over the next seven years. The CRC was founded in 2020. The majority of funding comes from the Cooperative Research Centre (CRC) Program, which is the Australian Government's flagship industry-led funding scheme.

Through collaboration and using new technologies presented by the 4th industrial age, Building 4.0 CRC aims to catapult the building industry into an efficient, connected and customer-centric future. Building 4.0 CRC's key goals are to deliver better buildings at lower cost and build the human capacity to lead this future industry.

<https://building4pointzero.org>

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