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Special technology issue

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Autonomous vehicles:

Driving independence, mobility and wellness in active-aging communities



In partnership with Regional Development Australia, autonomous vehicle specialist Aurrigo Pty Ltd. recently trialed its ‘pod’ service in the Elliot Gardens Retirement Village in Port Elliot, South Australia. An independent study by the Global Centre for Modern Ageing provided key insights. Here’s the story, and what it means for you

by Marilyn Larkin, MA

Autonomous (self-driving) vehicles represent a growing trend that now is emerging in the active-aging market—with a difference. Unlike high-profile self-driving cars that operate on main

thoroughfares, the autonomous vehicles being tested in senior living communities stay within the boundaries of the community, operating on preplanned routes.^{1,2,3}

Such was the case for Lendlease-owned Elliot Gardens, a retirement community located in Port Elliot, South Australia, that recently served as a testing ground for a two-month study with Aurrigo Pty Ltd., an Australian company that is part of Richmond Design & Marketing (RDM Group) UK. Aurrigo’s in-house autonomous vehicle team has produced over 40 self-driving pods for projects in Australia, Canada, Singapore, Finland,

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The Aurrigo PodZero® operated on several routes at Elliot Gardens, a South Australia retirement community, during its 2019 trial



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Elliot Gardens residents had 'mainly positive' attitudes about autonomous vehicles, with safety, fun and convenient among the positive words they used most often, reveals the Global Centre for Modern Ageing's research

Vietnam, the United States and the United Kingdom.

Vicki Neilson, manager of Elliot Gardens, said she “jumped at the opportunity” to participate in the trial. The community is home to 330 residents ages 65–96 years, who live in 194 villa-style homes on 27 hectares (67 acres). Neilson recognized the potential value of autonomous vehicles that could eventually enable residents to book their own rides without relying on shuttle buses or taxis, help those with mobility problems maintain their independence and social connections, and allow those with cognitive difficulties to visit friends and seamlessly return home.

For the trial, Aurigo assigned Elliot Gardens one of its PodZero® autonomous vehicles, which was operating in the Tonsley Innovation District, Adelaide, as part of the South Australian government's Future Mobility Lab Fund program. The battery-powered PodZero, named “Elliot” in a popular vote by

residents of the Landlease community, seats up to four passengers and operates through multiple sensor technologies. It's equipped with a “go” button to enable passengers to confirm when occupants are seated and ready to move, as well as several internal and external emergency stop buttons.

During the trial, Elliot was available on several routes within the community Mondays through Fridays, 9 a. m.–4 p.m. To take a ride, residents could hail Elliot at the community center or when it was passing by, or schedule a ride by text or phone. Australia's regulations required that a chaperone accompany residents at all times to maximize safety in case a problem arose. (To learn more, see the sidebar, “Behind the scenes at the Elliot Gardens trial,” on page 28.)

Australia's Global Centre for Modern Ageing (GCMA) conducted independent research before, during and after the trial, which led to feedback from residents and staff (further information

is available in the sidebars, “Global Centre for Modern Ageing and its role in the trial” on page 29, and “Insights from a real-world trial” on page 31).

“We never thought, originally, when the product was being developed, that we would be attracting so much interest from the retirement sector,” says Roger van der Lee, director of Autonomous Programs—Australia & Asia Pacific for Aurigo. “Now that we're in it, we're very cognizant of what the needs, wants and opportunities are, and we're working to provide them.”

The *Journal on Active Aging*® recently spoke with van der Lee about how the company planned for the Elliot Gardens trial and what's ahead. We also talked with Julianne Parkinson about how and why the GCMA supported the study and conducted its independent research. And we interviewed Village Manager

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Vicki Neilson about the senior living community's expectations and what was involved in the trial.

Launching a 'personal, on-demand mobility service'

"Unlike Tesla and other manufacturers that produce autonomous vehicles that run on the street and replace what we would consider a 'normal' automobile, Aurriigo produces 'first mile, last mile' vehicles that integrate with other transportation systems, such as a railway station or a bus stop—any place where the major transport infrastructure ends, but people want to take a journey from there to their destination," van der Lee explains.

Aurriigo's pods "are not shuttle buses that run on a particular timed route or schedule," van der Lee continues. "They're a personal, on-demand mobility service within a geofenced area, and they operate within that space to any destination that's identified by the user." He adds, "For example, we're now conducting a major trial, the UK Autodrive Project, in Milton Keynes, outside of London. The pod operates in a space about 3 kilometers by 1.5 kilometers, and it services the Milton Keynes' railway station and the business and residential district. In fact, the pods were originally designed to run in shopping malls, airport carparks and universities."

ML: Roger, how did you move from there into the retirement community arena?

Rv: Port Elliot and Regional Development Australia were keen to see this happen in a regional area rather than a major city. The Elliot Gardens study was certainly a first in terms of doing a trial in a retirement community anywhere in this country, as well as the first in a regional area.

ML: What needs to be done before the pod, with its current functionality, can be fully integrated into the community?

Rv: Building the communication channel is a crucial step. We need to develop the methodology that will enable people to book their journey. How do they initiate the fact that they want to be picked up at 10:15 from unit number 23 and they want to go to house number 152, because they want to catch up with a friend? Or they want to go from their residence to the community center, or out to the front of the community to catch a bus or post a letter?

We need to enable people to request the service, bearing in mind that many may not be familiar with texting on a mobile phone or even basic electronic systems. How do we enable them to do that in an independent manner, rather than their having to pick up the phone and perhaps call the front desk or a third party to do it for them?

The other issue is, how will the organization cost the service? Will it be part of the facility charge that the overall organization builds into its cost structure, or will it be some type of user pay system? If you have a community of 300 or 500 people yet only 30% or 50% are interested in or able to use the service, some residents might feel they don't want to subsidize the cost because they don't use it. But then, that same argument could be made about a swimming pool or a bowling green or a tennis court or anything else on-site that they don't use. I think when we get to the commercial stage that issue will need to be resolved on an individual basis at each location.

ML: You've said the Elliot Gardens trial is a first step in your work in active-aging/retirement communities. Once you get communication and cost settled, what's next?

Rv: Now we know we can provide mobility for people within their communities, either because their mobility is already impaired or (as an additional service) because they're transitioning from full mobility—they want to move

around within their environment and can't necessarily do that easily on foot. They also don't have to get into a car to drive a short distance within their community.

We recognize that, going forward, cognitive function may become an issue [in using the service]. We plan to apply existing technologies such as face recognition and artificial intelligence, so that when people approach the car door, the vehicle will recognize them and what their needs are.

For example, if individuals with cognitive impairment get into the pod, the pod will know where those people want

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Resources

Internet

Aurriigo—autonomous technology
<https://aurriigo.com/>

Elliot Gardens—Retirement by Lendlease
<https://www.retirementbylendlease.com.au/elliott-gardens/>

Global Centre for Modern Ageing
<http://www.gcma.net.au/>

Regional Development Australia
<https://www.rda.gov.au>

Tonsley Innovation District
<https://tonsley.com.au/>

Multimedia

Aurriigo's Official YouTube channel: Aurriigo Autonomous PodZero™ running at Elliot Gardens Retirement Village in Australia video
<https://www.youtube.com/watch?v=88rYpTUJE-s>

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At Elliot Gardens, more than one in three residents rode in Aurrigo's PodZero® during the two-month trial on the retirement community's campus

to go and will take them there, and when they get back into the pod, it will take them home if they can't remember where that is or how to get there. Or, if people have impaired vision or hearing, the pod would know they need audible information or visual aids. We would also need automatic deployment of a mobility ramp, so those who use a wheelchair or walker can enter and exit the vehicle easily.

One goal of doing the Elliot Gardens trial was to get feedback on what worked, what didn't work very well, what was missing, and how we might address those needs and wants. [Ed. The sidebar on page 31 takes a brief look at study insights.]

ML: *How long might it take to integrate those kinds of technologies?*

Rv: Those aspects could be added very, very quickly. The technology is available. It's a case of bridging the situation from running a trial to transiting to a commercial arrangement. If there was a commercial and business case to load

up the technology and deliver it, I could see that happening easily within the next year or two, which is exciting. Meanwhile, we've designed a new 12-passenger pod that will be deployed in Cambridge, UK, in a trial starting in August [as of press time]. It's part of our "first mile, last mile" transportation service in busy public areas, though it might well be adaptable to active-aging communities down the road.

We've already heard, anecdotally, that people at Elliot Gardens have said, "Well, I don't need my car anymore because I've got transport options at the front gate," or "I don't need a car within my own community because I've got a transport and mobility service available to me." That has all sorts of impacts for ground use. For example, do you need a garage anymore? If not, in terms of increasing the density on a given piece of land, that's more space you can use for other things. There are environmental and energy use implications, as well, so a whole lot of things flow on from the decision to use autonomous transport. [Ed. The JAA's interview with Roger

van der Lee was conducted prior to completion of the Elliot Gardens trial. He shares his comments about the study results in the sidebar on page 31.]

Behind the scenes at the Elliot Gardens trial

When Vicki Neilson was approached by Regional Development Australia about participating in the Aurrigo trial, she recognized that while an autonomous vehicle might or might not be immediately beneficial to Elliot Gardens, "it would be great to learn more about this new technology that could be something we might offer down the track."

ML: *Vicki, what work was involved in preparing for the trial?*

VN: The main thing we had to do was select the chaperone who would accompany residents during the trial and be able to take control should anything go askew. Of course, we also had to have appropriate signage throughout the village warning other road traffic—bicycles as well as cars—about the driverless vehicle. Aurrigo really did the biggest job; they had to map the village and create three different routes.

ML: *How did your residents respond to the trial launch?*

VN: There was quite a flurry initially. People wanted to try it simply out of curiosity. I guess the biggest thing was the age difference among our residents—65 to 96. Many of the younger ones, especially, want to keep their mobility for as long as possible. For them, going from A to B within the village in a pod was more of a joyride than a necessity, although some do come in their vehicles to the community center if they live a bit far from the center, so the pod could potentially replace those trips. I think some people felt that if they want to be mobile for as long as possible, then they

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Global Centre for Modern Ageing and its role in the trial



Elliot Gardens residents took part in a workshop with stakeholders to provide Aurrigo with ideas for future vehicles. Image courtesy of Aurrigo

The Global Centre for Modern Ageing (GCMA) was launched in South Australia to make it easier for businesses and their research partners to develop products and services for an evolving “modern ageing marketplace.”

Located at Tonsley Innovation District in Adelaide, the GCMA also operates a LifeLab, a testing facility that enables businesses to trial their products and services in a simulated real-life environment. The organization’s overarching objective is to inspire governments, businesses, researchers and older people to seek and develop solutions that reflect the opportunities for modern aging.

The GCMA’s expert team operates within the standards of the European Network of Living Labs, and its LifeLab is one of only 13 such labs worldwide specializing in aging.

“We know that a child born today has a one in three chance of living to be 100,” CEO Julianne Parkinson notes. “Whilst living 10, 20 or 30 years beyond traditional retirement is more commonplace today, this shift is not short-term. Increased life span will continue to be part of the fabric of our society for decades to come. That’s why investing in solutions to improve the quality of life through better choices of products and services makes good sense.”

Through LifeLab and projects such as the Aurrigo trial, the GCMA is helping to ensure that older adults are an integral part of any research aimed at developing products and services for their use, at every phase, Parkinson explains.

That’s where the Elliot Gardens autonomous vehicle trial comes in. Throughout the trial, the GCMA independently collected resident mobility-behavior information and user feedback about the

service and the pod to assist Aurrigo in enhancing it.

The research measured such factors as whether there was an increase in overall movement around the village; whether the residents enjoyed the experience; and whether they saw a use for the technology in similar settings (see the sidebar on page 31 for results). Information was gathered through pre-/post-surveys and data collection through observations and individual interviews as well as a workshop held on May 8, shortly before the trial ended.

What does the GCMA look for in a community research partner?

“Firstly, we look for leadership and a culture where the trial is welcomed and has buy-in from all involved,” Parkinson comments. “Secondly, that those involved represent the people most likely to benefit from the outcome of the trial.”

Parkinson emphasizes, “The bottom line for us, and why we were eager to support this trial and will likely support others, is that these vehicles have the potential to improve people’s lives and give them more confidence and access to the places they want to go and people with whom they want to meet.” She concludes, “It really helps to level the playing field for all people to engage in life.”

Reference

1. Her Majesty’s Government, Office for National Statistics. (2016, January 14). What are your chances of living to 100? Available at <https://www.gov.uk/government/organisations/office-for-national-statistics>.

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Residents at Elliot Gardens opted in for rides in Aurrigo's autonomous vehicle with an 'enthusiastic curiosity'

need to walk as much as possible. [Ed. For more study results, see “Insights from a real-world trial” on page 31.]

ML: *From your perspective, did everything run smoothly?*

VN: We had one issue only: The pod wanted to drive into the gutter at one point, but the chaperone quickly fixed that by remapping. There were no other incidents. The pod has these super-sensitive wings that detect anything in front of or behind it, so it stops quite readily. Of course, the passenger has to be strapped in with a seatbelt as in a regular car. So, we didn't have any incidents to speak of over the entire trial period.

ML: *What advantages do you envision down the road?*

VN: I see the Aurrigo pod or equivalent autonomous vehicle as being a marvelous invention for somebody who no longer drives or has difficulty walking, who might have to go a half-kilometer down the road to the pharmacy, or to buy a liter of milk in the grocery, or to meet someone for coffee—the idea that

they can go in the pod and then dial it to come and pick them up. That would be fantastic for people who are mostly housebound and rely on other people or taxis to take them where they want or need to go.

A couple of village managers within our group in Victoria emailed me and asked, “How do we get hold of one of these?” They didn't quite understand that we hadn't bought it and that it was part of a trial. But their residents had seen the information we sent out and were quite excited about having access to an autonomous vehicle. So, there's definitely interest. I think once the vehicle can go door-to-door, 24/7, it will be used more by everyone.

ML: *What are your take-home messages for readers who may be considering getting involved in an autonomous vehicle study in their own communities?*

VN: I would say embrace it wholeheartedly. The world of technology is racing ahead before our eyes and I think it would be marvelous to be part of it, to the point where you could have a driverless

vehicle in your retirement living community. I can't see a negative other than the management of it, and I guess there's always a worry that something might go amiss. But then again, risks are also involved in having regular automobiles in the community—someone might hit the accelerator instead of the brake.

My feeling is that people in our community are here to be active, enjoy life, and have as much as possible at their fingertips. The pod can add hugely to that freedom and to feeling like, “Yes, I can do this! I don't have to rely on taxis, relatives or neighbors.” Even though residents may not be walking as much as perhaps they once did, they're still getting on and off the pod, they're socializing, they're going for coffee instead of sitting at home. All this contributes immensely to wellness and quality of life.”

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1. Bowers, L. B. (2019, March 22). California CCRC to be testing grounds for self-driving vehicles. *McKnight's Senior Living*. Retrieved from <https://www.mcknightsseniorliving.com/home/news/california-ccrc-to-be-testing-grounds-for-self-driving-vehicles/>.
2. Sudo, C. (2019, March 17). Senior communities become key testing ground for self-driving cars. *Senior Housing News*. Retrieved from <https://seniorhousingnews.com/2019/03/17/senior-communities-become-key-testing-ground-for-self-driving-cars/>.
3. Aurrigo Driverless Technology's Official YouTube Channel. (2019, April 10). Video: *Aurrigo Autonomous PodZero™ running at Elliot Gardens Retirement Village in Australia*. Available at <https://www.youtube.com/watch?v=88rYpTUJE-s>.

Images courtesy of Aurrigo

Insights from a real-world trial

What did the Global Centre for Modern Ageing (GCMA) find with its independent study of the Elliot Gardens autonomous transportation trial, which took place March 28–May 23, 2019? The research examined residents' attitudes, perceptions, usage and experiences with Aurrigo's PodZero® vehicle at Elliot Gardens Retirement Village in Port Elliot. The small town is a popular holiday destination on the Fleurieu Peninsula, near Adelaide, South Australia.

In addition to interviews, observations and surveys, GCMA held a co-design workshop on May 8 in which stakeholders and more than 40 Elliot Gardens' residents discussed ideas for future vehicles. This input will contribute to Aurrigo's efforts as it continues to develop its driverless technology and service,¹ suggests Roger van der Lee, director of Autonomous Programs–Australia & Asia Pacific for Aurrigo Pty Ltd. “The Elliot Gardens Trial was very successful in terms of exposing the capability of driverless technology to the retirement living sector and attracted a lot of interest and positive feedback,” he comments.

Residents had “mainly positive” attitudes about autonomous vehicles,² the GCMA study shows. Among the positive words linked with these vehicles, the ones used most often included *safety, fun, quiet, handy, useful, efficient* and *convenient*. In fact, positive, neutral and novelty words associated with autonomous vehicles increased by 7%—from 85% to 92%—after the study.

While residents welcomed the opportunity to use the pod, repeat usage proved “lower than expected,” van der Lee says. He cites two main factors for this repeat-usage level:

- People satisfied their “enthusiastic curiosity” with their first use of the pod.
- Many individuals thought Aurrigo's driverless vehicle “was a great idea and service for those with mobility restrictions, but they were ‘not at that stage’ and wished to retain their fitness by walking.”

Participants ranged in age between 65 and 96 years, with 78 the average age.² The research showed residents used their own vehicles to drive the short distance to local shops and facilities in the surrounding community, van der Lee notes. “Strong support was reported for extending the operation of the pod to those locations (up to two kilometers), which were out of the scope and regulatory approval for this trial. Such a service would remove the need for using a private car,” he explains. “Likewise, linking the pod to a public transport service was also considered to be valuable; however, no public transport serves Port Elliot.”

Summarizing Aurrigo's take-aways, van der Lee observes that “the trial indicated a niche for autonomous mobility in this sector where at least some of the following factors apply:

- Age or health create a need for a mobility service.
- The population is large enough to support the service (from a commercial perspective).

- Environmental factors such as the size of the site, accessibility challenges (e.g., hilly terrain) or weather make walking less attractive.
- Private motor vehicles are not widely used due to lack of ownership, garaging facilities, etc.
- The mobility service operates over routes which enable access to facilities and resources within and outside the [retirement community].
- The mobility service connects to other mainstream transport services; for example, the service is door to door and on demand.”

The study report's design and service recommendations also included such things as a smartphone app for ride hailing and in-ride information, storage space for wheelchairs/walkers, varied vehicle sizes, and some benefits most often associated with car ownership—the abilities to listen to music, control the temperature and transport an animal.

References

1. Global Centre for Modern Ageing. (2018, 27 May). Farewell to Elliot: wrap up from the Aurrigo trial. Retrieved on August 1, 2019, from <http://www.gcma.net.au/latest-news/2019/5/27/farewell-to-elliott-wrap-up-from-the-aurrigo-trial>.
2. Mustonen, V., McCabe, A., & Wilson, A. (2019, June). “Elliot” Autonomous Vehicle Trial Summary report. Elliot Gardens Retirement Village, March–May 2019. Tonsley, South Australia: Global Centre for Modern Ageing. For inquiries about the full research paper, contact Aurrigo at australia@aurrigo.com.