



White Paper



**TECHNOLOGY
THAT HELPS
TAKE CARE OF
THE ELDERLY**

**Vox I.C.E is an
innovative remote
care solution for
independent seniors
living on their own.**

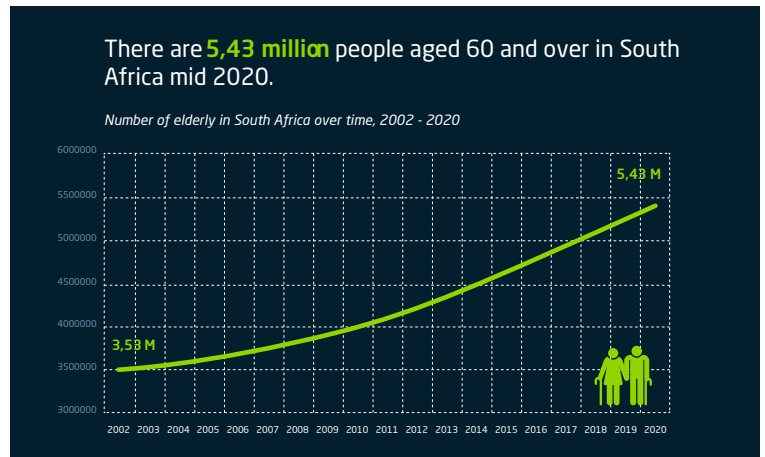
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MARKET OVERVIEW: SOUTH AFRICA'S AGING POPULATION

At 8.7%, South Africa has the highest proportion of elderly people (those aged 60 and above) in its population on the continent. According to UN research, this percentage is expected to double by 2050.

Furthermore, the growth rate among the elderly in the country rose from 1.1% in 2002/2003 to 3% in 2019/2020. Today, they account for more than 9% of South Africa's 59.62 million people.



Source: Stats SA

As can be expected, a growing aging population also sees an overall increase in the proportion of individuals with chronic conditions as well as those with co-morbidities. Research has found that elderly people are more than twice as likely as under-60s to develop one Chronic Disease List (CDL) condition.

Beyond the health impact on the elderly, the development of a chronic condition also translates into a substantial increase in monthly medical expenses (more than three times higher than those without any chronic conditions).

Number of CDL conditions by age group in South Africa private sector. January - December 2015



Source: South African Health Review 2019

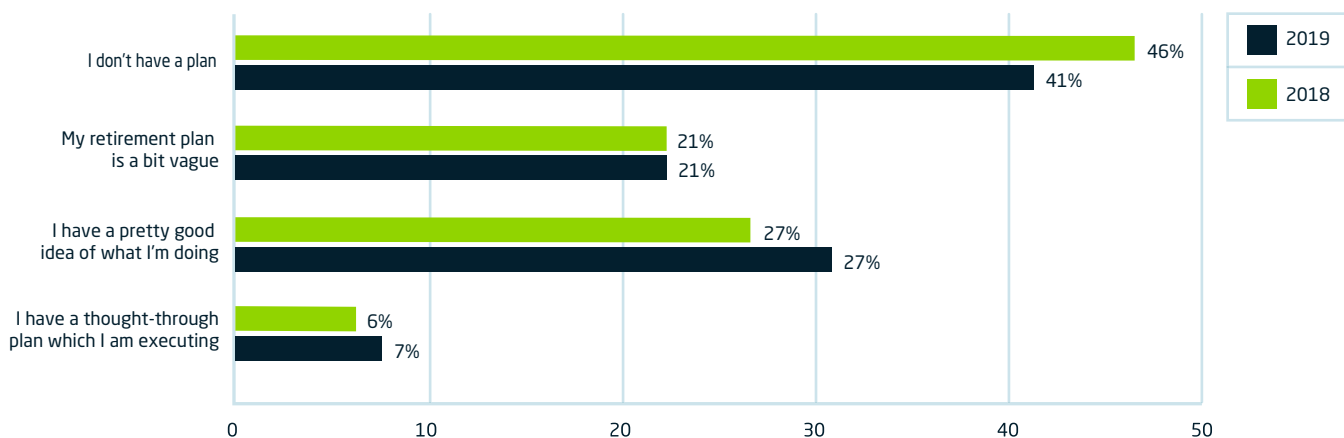
In a developing market like South Africa, the situation becomes more complex given the high cost of private health care. In fact, health insurance coverage amongst the elderly in the country is low (22.9%). Even though older people, like all South Africans, receive free public primary healthcare, there are still challenges in accessing it.

This is especially the case with those living in remote and rural communities where it is not easy to travel to clinics. And when they do get

there, there are inevitable delays in receiving care due to long lines of people.

Things are not much better from a retirement perspective. A 2019 report has found that only 6% of South Africans are executing a retirement plan that they had properly thought through. And when one factors in that almost half of the country's adult population live below the upper-bound poverty line, being able to access quality healthcare once retiring becomes even more of a challenge.

How do you feel about your current retirement plan?



Source: 10X Investments

Beyond the costs associated with managing CDL conditions, the elderly have the highest risk of death or serious injury arising from a fall. World Health Organisation (WHO) research has found that falls are the second leading cause of unintentional injury death globally after road traffic injuries. Furthermore, over 80% of fall-related fatalities occur in low- and middle-income countries.

Falls can cause both physical and psychological harm. Among the participants of a study tracking the impact of falls on the elderly, injurious falls resulted in a variety of conditions, including hip fractures, other fractures, and soft tissue injuries. These resulted in a decline in the quality of life for the individuals affected. Other research highlights how falling once often triggers a fear of falling again, likely impairing one's sense of mobility and autonomy.

This fear is a proven risk factor for future falls. So, if an individual falls once, it can likely result in a snowball effect of other negative health outcomes. Statistics show that only 22% of the elderly surveyed were able to function on their own after being discharged from hospital following a fall-related injury. Even once active, individuals tend to reduce their activity levels due to the fear of falling again.

According to another study, elderly aged 70 and older who experience falls are much more likely to be severely injured and less likely to survive their injuries compared to those younger than 70. Elderly patients are three times as likely to die following a ground-level fall compared to their under-70 counterparts.

The WHO advises that fall prevention programmes must form an integral part of elderly care. Its recommendations include several tactical ideas such as:



Screening within living environments for risks for falls.



Home assessment and environmental modification for those with known risk factors or a history of falling.



Prescription of appropriate assistive devices to address physical and sensory impairments.



Community-based group programmes which may incorporate fall prevention education.

In South Africa, there are several factors that contribute to the causes of falls. These can include:



Poor cognitive function.



Self-reported medical conditions (Parkinson's disease, stroke, foot disorders and urinary incontinence).



Number of comorbid conditions.

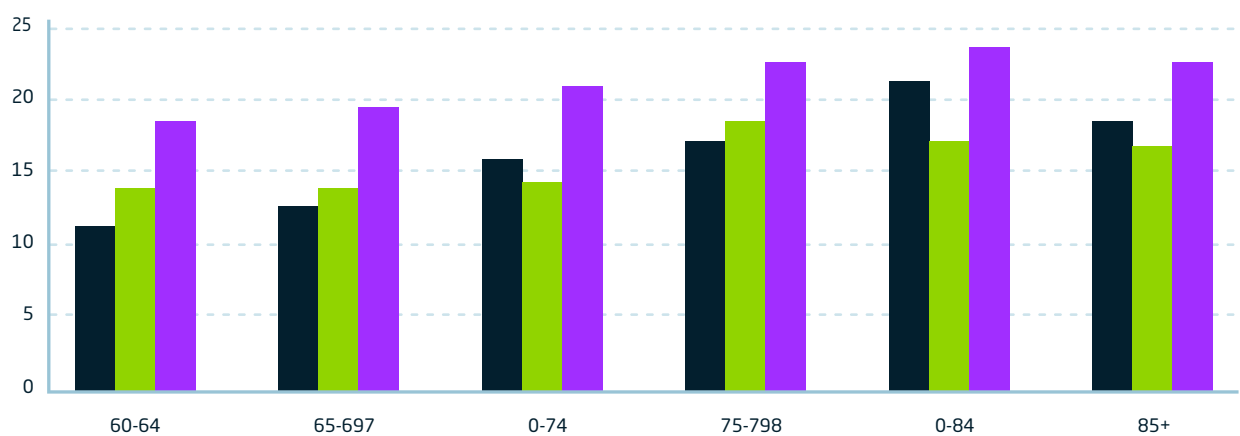


Number of residents in a household.

All indications point to the importance of proactively managing instances of falls. And to do so, requires the ability to effectively analyse data when it comes to any history of a previous fall, dizziness, and vertigo. This is especially critical for those individuals who either prefer independent living or have no choice (financial or otherwise).

In South Africa, the number of elderly living alone are on the rise. Among those, there is an upward trend reflecting the life course stages of the nuclear family among those that are entering old age (60 to 64), as well as widowhood contributing to single-member households at oldest ages. As elderly people advance in age towards the age of 75 and older, they mostly reside with extended families, while others live independently due to loss of spouses.

Percentage of single-member households by age of household head



	60-64	65-69	70-74	75-79	80-84	85+
1996	12.1	13.21	5.9	16.92	1.61	9.3
2001	13.7	13.71	5.0	17.71	7.51	8.7
2011	18.7	19.02	0.4	22.12	3.82	3.3

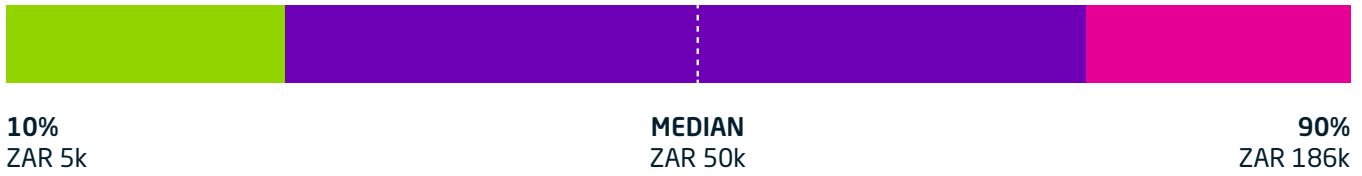
Source: Stats SA

Of course, there is no silver bullet approach to caring for the elderly. The amount of care required differs significantly from person to person. Those not living in a retirement village or frail care facility, would typically require a caregiver to be available when it comes to the potential for accidents and other events that can happen while the elderly person is on their own. This can include everything from an accidental fall, unexpected illness resulting in being unable to get out of bed, forgetting to perform routine tasks (such as closing and locking doors), and leaving the property without any form of communication.

Combining a lack of retirement savings with the high cost of chronic medication results in a situation where most South Africans are unable to afford a live-in caregiver.

Average Live-In Caregiver Salary in South Africa

R50,244



Source: *Payscale*

And given the expected increase in the number of elderly people in South Africa, there are simply not enough dedicated places available to care for this demographic. Statistics show that there are an estimated 1 150 residential facilities for older people but only 415 of them are registered with the Department of Social Development.

Additionally, the same research shows that there is also a shortage of trained professional nurses and staff who are skilled to take care of older people. Inevitably, this has given rise to incidents of neglect, abuse, and even the deaths of residents in some of these facilities.

This means relatives and close friends are relied on to check in on the elderly living alone at home. But if there is an emergency, these visits come too late to provide the immediate assistance required.

It is especially the case for those living in rural areas where there is no immediate access to healthcare services. Up to now, those individuals could not simply press a button and have immediate help available to them.



THE IMPORTANCE OF TECHNOLOGY

An international study has found that a programme combining home modifications with specialised counselling may help seniors disabled by aging stay in their homes longer.



The researchers interviewed volunteers about their inability to accomplish activities of daily living at the study's start and then again at five and 12 months. By the end of the study, those in the active treatment group were more likely to say the programme made their lives easier (82.3% versus 43.1%), helped them take care of themselves (79.8% versus 35.5%) and helped them gain confidence in managing daily challenges (79.9% versus 37.7%).

This is hardly surprising given how a person's home represents a familiarity which no facility can provide. Some experts suggest that allowing an aging parent to remain at home is the least invasive intervention and can be successful as long as it is approached realistically.

But beyond modifying the residence (an expensive undertaking on its own) and spending much-

needed funds on a counsellor, telecare provides a more affordable alternative. Telecare can be defined as the continuous, automatic, and remote monitoring of real-time emergencies and lifestyle changes over time to manage the risks associated with independent living. In layman's terms it enables vulnerable, elderly, and even disabled people to live longer on their own at home through remote monitoring and emergency alarms.

As part of this, there are several technologies that can support the independence and security of an elderly person. The book, "Technology for Adaptive Aging", highlights monitor and response systems as one such option. These can monitor both for emergency response to crisis situations and for early warning for less critical and emerging problems.

Monitoring systems can be classified as follows:

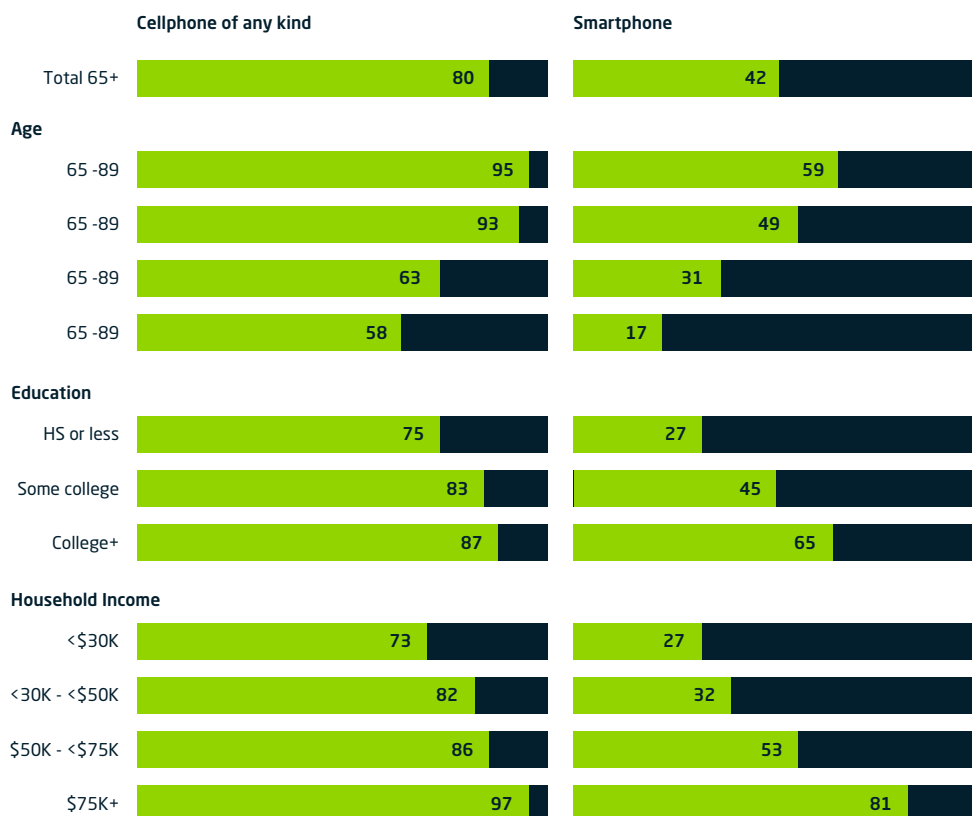
- What information is being recorded or transmitted? It could be medical information (e.g. heart rate, respiration, and blood pressure), movement data (e.g. restlessness in bed), or simply awareness information (e.g. a video transmission to a relative).

- For how long will the data be analysed? The capture of information can be for instantaneous purposes only (e.g. a 'GrannyCam') or over a period of time for trend analysis as you would expect for vital signs in a telemedicine application or in medication monitoring for compliance in a home or assisted living environment.
- How is information reported to relevant individuals? Medical alert systems provide a phone call to a response agency. Telemedicine applications report over a secure channel to an electronic patient record that can be consulted by trusted medical professionals or even by the individual being monitored. Cameras are used to provide easy monitoring for family (usually over the Internet, serving an important social communication function discussed below) or remote caregivers (at a nursing station, for example).
- What is the role of the older person in using the technology? Does the monitoring require any instrumentation or active cooperation on the part of the individual being monitored? For example, do they have to wear an infrared badge for a positioning system, or is it passive, with the environment instrumented to measure a naturally occurring phenomenon using devices such as a motion detector or face recognition system?

Fortunately, elderly people are more open to using technology to improve their lives than at any time in the past. The stereotype of asking a grandchild to programme the VCR has been replaced by a grandparent video conferencing from their phone with loved ones anywhere in the world.

Roughly four-in-ten seniors are smartphone owners

% of U.S. adults ages 65 and older who say they own the following...



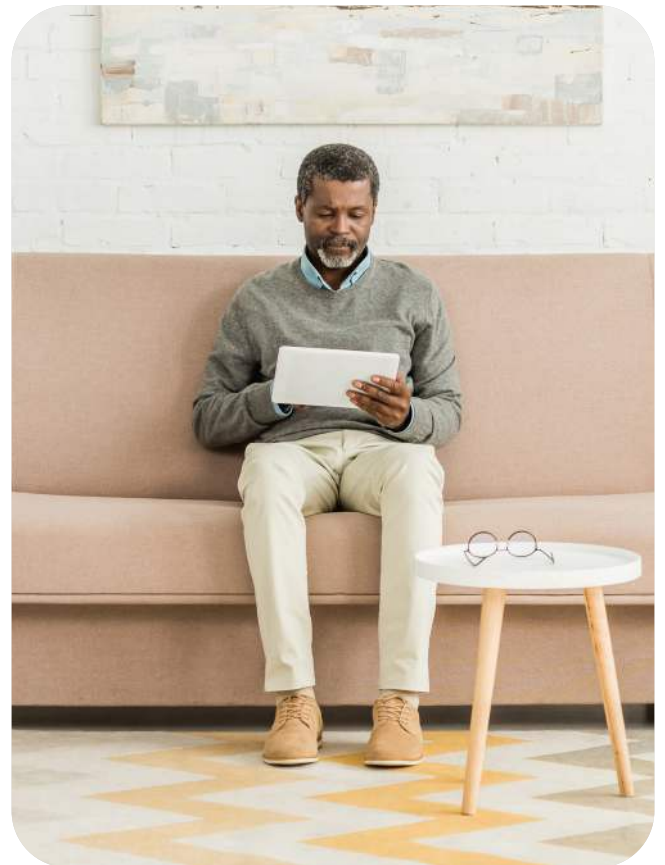
Source: Survey conducted Sept 29 Nov 6, 2016. "Tech Adoption Climbs Among Older Adults."

PEW RESEARCH CENTRE

To this end, Smartphone ownership in the US more than doubled from 2013 to 2016. Furthermore, in this demographic, internet adoption has also steadily increased as more seniors are going online. Meanwhile in South Africa, 27% of people older than 50 report owning a smartphone.

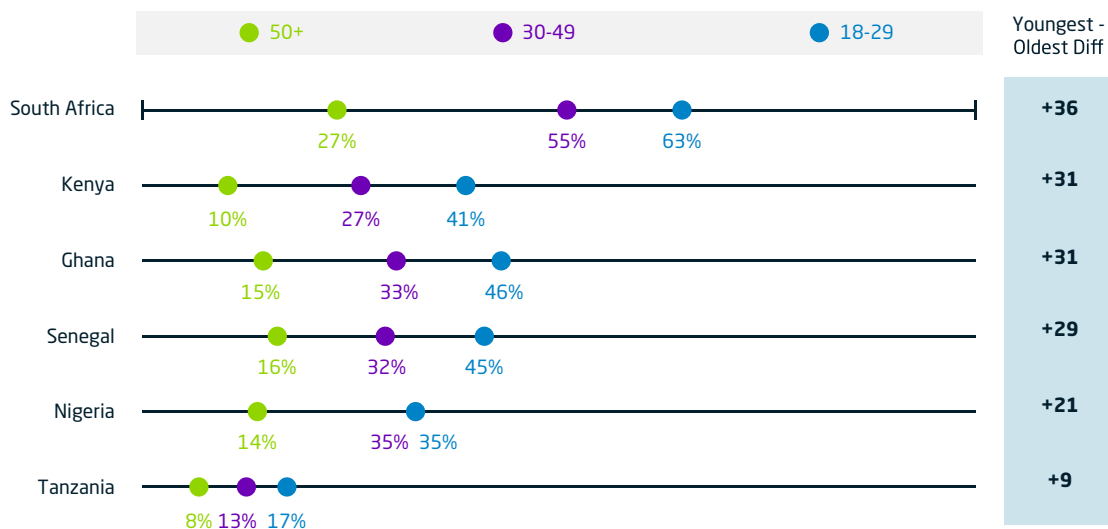
Almost 50% of those surveyed say the internet has positively impacted on their lives. This points to a growing realisation of the importance technology plays in all facets of society. So, even though technology can still be overwhelming for many seniors, the socialisation, safety, entertainment, and convenience it brings to their lives go great lengths to seeing them take the leap and embrace it.

As far back as 2010, a study found that the use of new technology by the elderly population has a beneficial effect on their quality of life. Moreover, by understanding the difficulties that the elderly experience in their daily lives but also with using technology, will significantly contribute to the improvement of their quality of life.



Smartphone ownership more common among younger sub-Saharan Africans

Adults who report owning a smartphone



Note: Percentages based on total sample. Significant differences shown in Bold.
Source: Spring 2017 Global Attributes Survey. Q65.

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IOT AS AN ENABLING SOLUTION

Even though the Internet of Things (IoT) has been around for some time (think of your car tracking device as an example), its use cases are continually evolving.

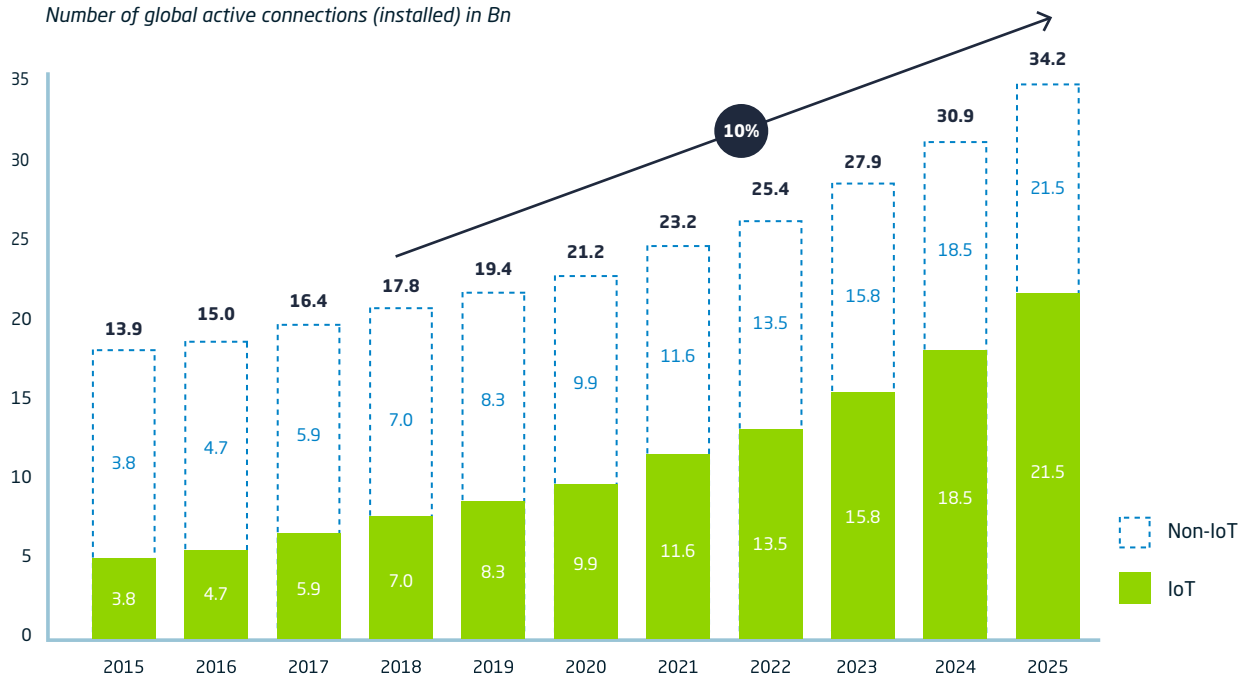
From smart infrastructure (water and electricity meters) to healthcare (connected pacemakers), and entertainment (smart television) to security

(home surveillance), the practical applications of IoT devices are myriad.

In fact, such is the importance of IoT in the digital world today, that there will be an estimated 9.9 connected devices worldwide by the end of this year with the number continually growing as more 'things' start getting connected.

Total number of active device connections worldwide

Number of global active connections (installed) in Bn



Note: Non-IoT included all mobile phones, tablets, PCs, laptops, and fixed line phones. IoT includes all consumer and B2B devices connected - see IoT break-down for further details. Source: IoT Analytics Research 2018

From an end user perspective, many people think that IoT does not impact them all that much. But such is the extent of its evolution, most consumer electronic devices can be considered IoT. In its most basic form, an IoT device is something that has an internet connection.

Think smart watch, smart running footwear, smart fridges, the list goes on. It is especially when it comes to home automation, that IoT is predicted to make the most significant impact for the consumer market.

Adoption of smart speakers like Amazon Echo and Google Home might not be that significant in South Africa yet, these innovations do provide a glimpse at what the technology is capable of doing and how it can seamlessly integrate into all aspects of our lives.

Globally, the consumer IoT market was valued at more than \$52 billion in 2019 and is expected to generate revenue of \$188 billion by the end of 2027.

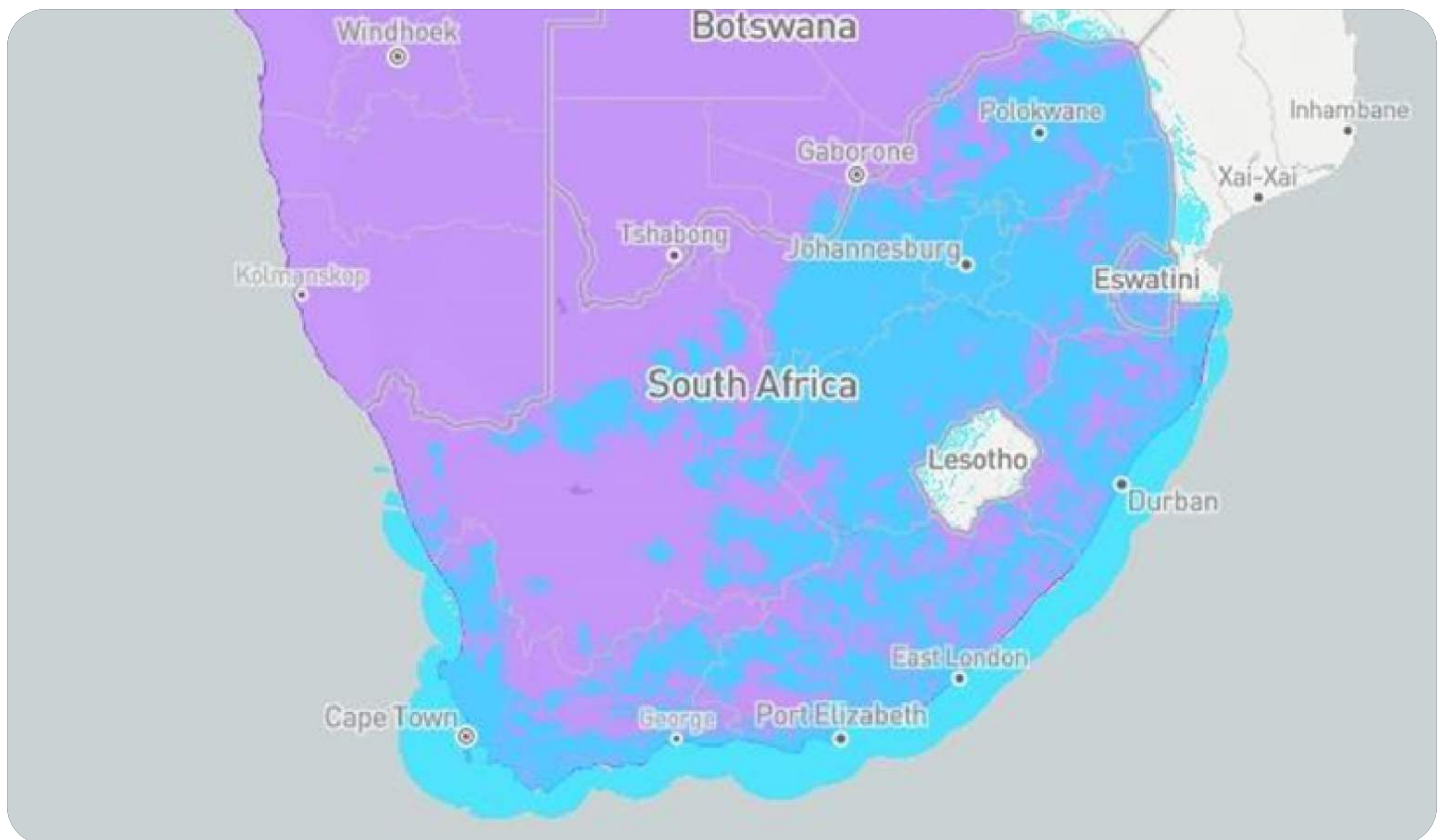
Its growth can be attributed to the increased awareness about health (fitness devices as example), the increasing number of internet users, the adoption of smart devices, and customer demand for convenience when it comes to their personal lives.

As such, the potential for IoT in the elderly market is massive. But many may think that having an IoT device is an expensive undertaking requiring a significant amount of data. While there is an

element of truth to this especially when looking at smart speakers and televisions, there are also 'low impact' IoT devices that run on the Sigfox Network. Think of this as an exclusive highway dedicated for the data traffic of IoT devices.

Founded in 2010 with a vision to connect every object in the physical world to the digital universe, Sigfox is already present in 71 countries, covers more than five million square kilometres and manages 30 million messages daily.

This means that IoT devices that connect to the Sigfox network are managed by the vendors and manufacturers distributing them. In other words, a home user has no need to have dedicated internet access to benefit from an IoT device or even the Sigfox network as this happens all in the background.



Sigfox South African coverage map

VOX I.C.E

In partnership with SeniorAdom, a global provider of a leading telecare and monitoring system supporting and protecting millions of people, Vox is delivering an innovative solution that not only changes lives but saves them as well. In recent years, Vox has evolved from being a connectivity provider to a company that brings solutions to market that can positively impact South Africans from all walks of life.

To this end, Vox ICE (In Case of Emergency) is a first of its kind in the country. It sees the international best practice of SeniorAdom combined with the local expertise and insights of Vox to deliver an affordable and user-friendly solution that addresses the problem of monitoring the elderly who live independently at home in a non-intrusive manner.

Designed and developed by professionals from the medical, paramedical, and social sectors, Vox ICE consists of the following:



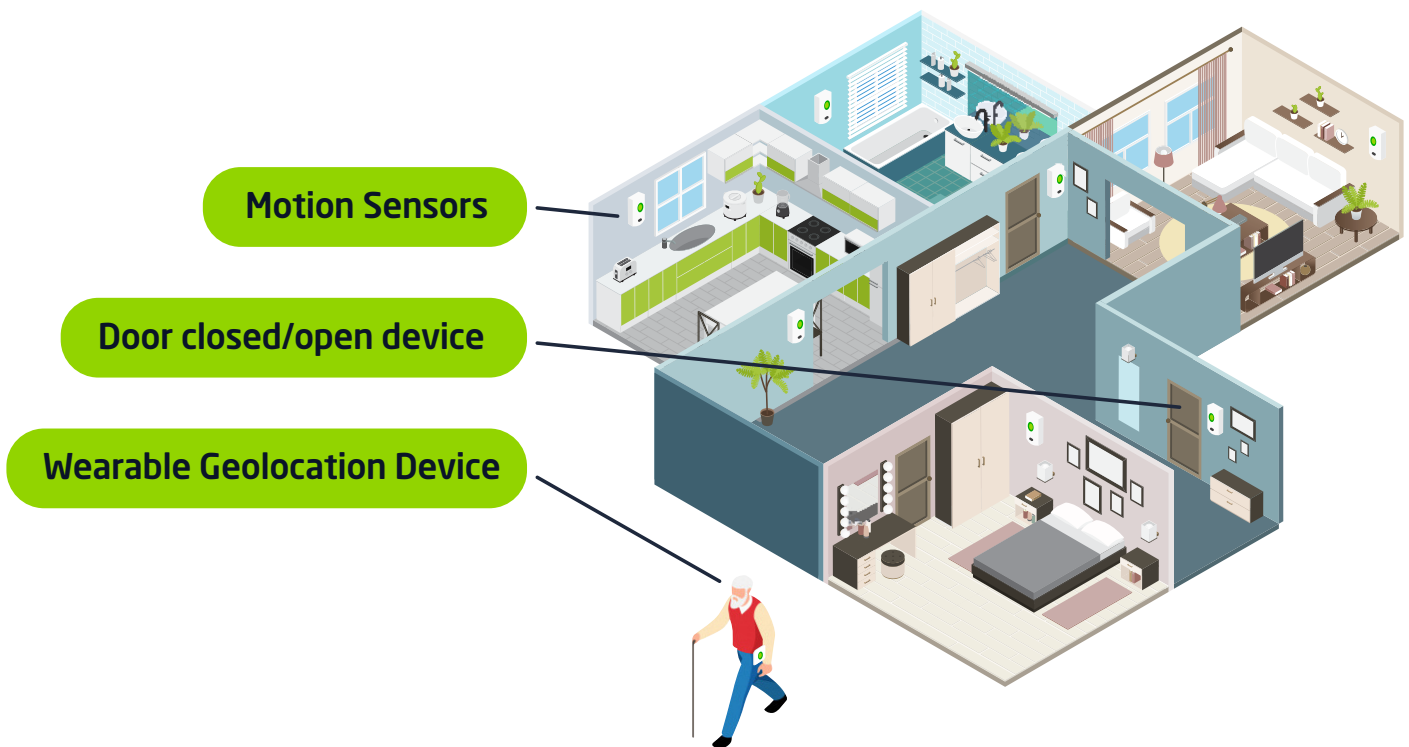
Motion sensors that are installed at strategic places inside the house.



Sensors to be placed at frequently used doors such as the front and back entrances.



A wearable geolocation device.



Unlike many other monitoring solutions, Vox ICE is completely non-invasive. It runs movement data captured by the sensors through a deep learning engine that builds trends and events around the elderly person living on their own. Once an event outside the norm takes place, for example a fall or not locking the back door after a certain amount of time, an alert is sent to a predefined list of emergency contacts. This can either be the next of kin, a neighbour, a caregiver, a control centre (in the case of a frail care facility), or even emergency response.

Within a few weeks, Vox ICE learns the habits and behaviours of the person it monitors and flags any potential issues in real-time before they become catastrophic.

The pendant doubles as a panic button but can also send an alert if the person moves outside a specified area. It features an accelerometer that detects rapid movements based on complex algorithms to detect when a person falls outside the home.

Below are some of the examples of the analytics and reports that Vox ICE compiles:

Figure 3: Full view on status of Installed Devices

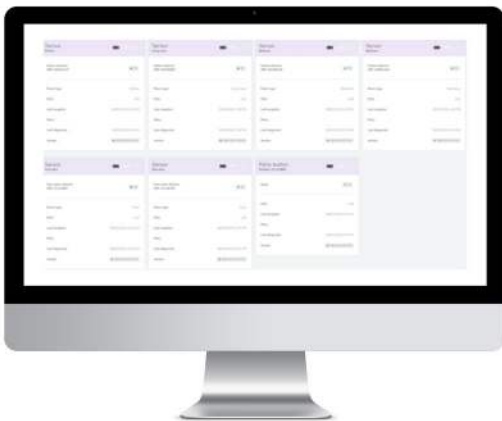


Figure 4: Analysis of Daily Activities



Figure 5: Detail analysis of Specific Activity



Figure 6: Analysis of specific behavior over period of time (Sleep Pattern)



Figure 7: Summary of Analysis over a period of time

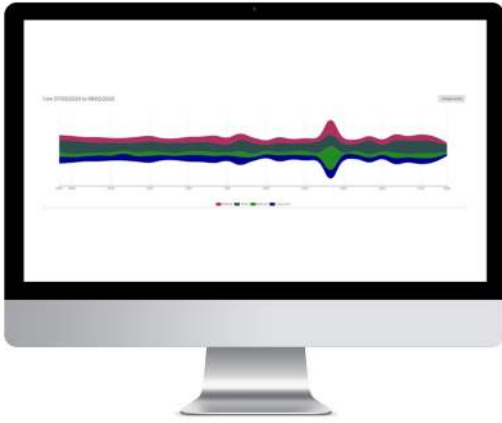


Figure 8: Temperature Analysis

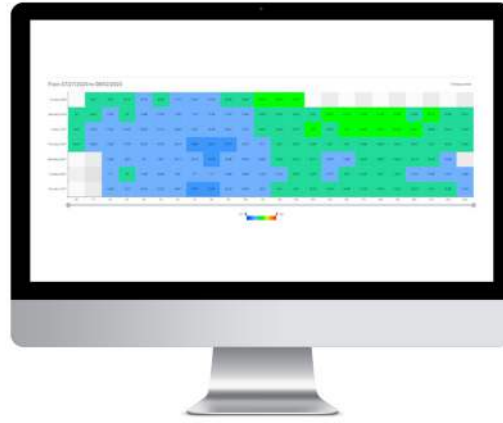
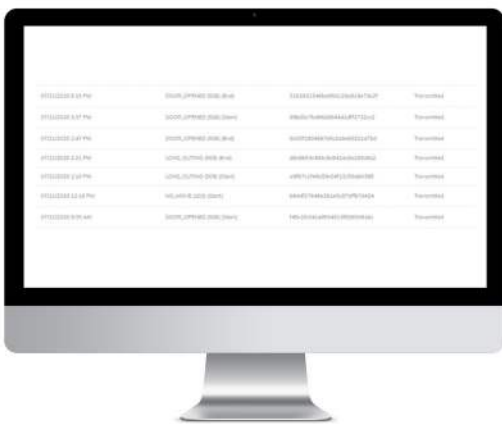


Figure 9: Alerts Example



Unlike many other monitoring solutions, Vox ICE is completely non-invasive.

The caregiver can access any of these and many other reports providing real-time information through a user-friendly platform from a Web browser or a smartphone application. Additional features include:



Being able to check the status of each device.



Setting predefined parameters for the devices.



Modifying the list of caregivers able to access the system.

As Vox ICE is a life-saving solution, it has built-in battery power and relies on the Sigfox global network. Not only does this mean it mitigates the risk of power failures, but no existing internet connectivity is required on site. It is a completely self-contained offering with everything built in to deliver a complete plug-and-play experience at an affordable price.

The network covers 93% of South Africa's population and more than half the country.



Scenario

Jane Doe is a healthy 79 year-old living on her own.

She attends a book club on Wednesdays from 10:00 to 12:00 and goes shopping on Tuesday mornings. She usually wakes up between 06:00 and 07:00 and has breakfast in her lounge between 08:00 and 09:00. Jane takes a nap in the afternoons from 14:00 to 16:00 and catches up on her favourite TV shows from 17:00 to 20:00. Jane goes to bed by 20:30.

She is very safety conscious and always keeps her doors closed. Her son lives a five-minute drive from her and checks up on her randomly with a quick phone call.

Vox ICE can assist him in any of the following scenarios:

- She forgets to close the door. An alarm is sent to her son who can remind her to do so.
- She is not feeling well and decides to stay in bed. The Vox ICE algorithm picks up on this unusual behaviour and sends an alarm to her son to check up on her.
- She accidentally falls and cannot get up. The motion sensors in her house detects this abnormal movement and alerts her son.
- When she goes shopping, the geolocation device is on her keyring. This means she can be tracked. If she requires assistance, Jane can easily be located by her son.

CONCLUSION

Technology has improved people's quality of life. And despite the challenges around accessibility of quality healthcare and the high cost of chronic medication for the elderly, people are independent for longer in their lives.



Some prefer to live on their own for as long as possible preferring the routine and familiarity of their home environment. Thanks to the availability of the Vox ICE solution, more elderly people can now afford to stay home. The non-invasive sensors have no impact on an individual living alone and does not record video providing a completely private experience.

Vox has made ICE a modular subscription service. It can be customised according to the unique

requirements of each individual customer. The data collected complies with local and international regulatory requirements giving people the peace of mind that their information remains safe.

It is the perfect non-invasive solution that provides telecare to South Africans irrespective of their physical location. With Vox it is about saving lives and delivering innovation that solves a significant human challenge through technology.

About Vox

Innovation and insight combine in Vox, a market leading end-to-end integrated ICT and telecommunications company. We have an enviable track record of meeting the needs of thousands of consumers, SMEs, large corporates, and public sector organisations. Thanks to our dedicated staff of more than 1 500 people – and our several hundred business partners countrywide - we set the benchmark for service delivery by connecting people through best of breed technology.

From data to voice, as well as Cloud, business collaboration and conferencing tools, Vox offers intelligent solutions that connect South Africans to the world, supporting entrepreneurs, customers and commerce, whilst practicing values of integrity, choice and service excellence in all of its dealings.

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