

AAL Market and Investment Report: Summary

A study prepared for the AAL Programme by the
Technopolis Group

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Introduction

The AAL Market and Investment Report was commissioned by the Ambient Assisted Living Association and aims to provide a consolidated view of the existing market and investment information in Europe for the AAL domain. It covers data relevant for Active and Assisted Living (AAL) and related technologies including current status, trends and future perspective for opportunities in the European Union (EU) and where possible link those to innovation in delivery of services.

This report may serve as a guide to investors, start-ups and small and medium-sized enterprises (SMEs), mature companies, and policy makers and public procurers that are interested in becoming more familiar with the market to support the independent living of older people.

The AAL market

The AAL domain represents solutions (i.e. bundled products and services) that have an information and communication technology (ICT) component and are of direct value to older people, their families and carers to enhance their health, wellbeing and independence. AAL solutions may also benefit older people indirectly by increasing the efficiency and effectiveness of systems responsible for their wellbeing, health and care. The AAL market therefore seeks to provide these solutions across a range of industry areas to private consumers as well as to public bodies responsible for delivering services for older people. The ultimate aim of these solutions is to help improve the quality of life of older citizens, support their independent and healthy living, whilst reducing the pressure on national health and care systems. Amongst others, the AAL¹ market focuses on supporting access to care, including emergency response, (remote) monitoring of health parameters and daily routine, and communication with carers.

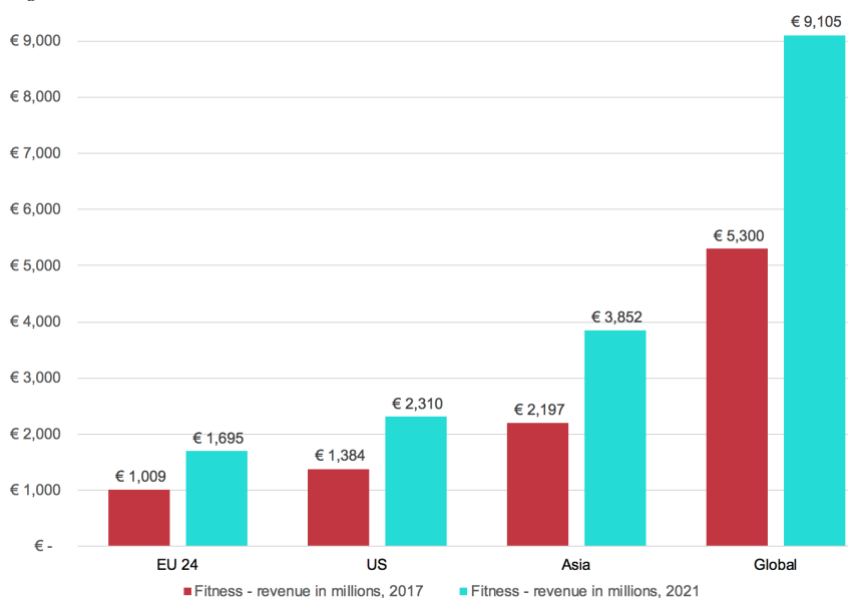
The size of the AAL market in the EU and globally

Statista's Digital Market Outlook estimated that the size of the EU AAL market² in 2017 was €186m and it would grow to €1,384m by 2021, a sevenfold increase in four years. The largest AAL markets in the EU are forecasted to be Germany (€383m or 31% of the AAL market in the EU), the UK (€232m, 21%), France (€180m, 13%), and Italy (€139m, 6%) in 2021, which together represent over two thirds of the total EU market. Yet, in 2017, the AAL household penetration in these countries was rather limited, ranging just from 0.2% in Italy to 0.5% in Germany, but expected to increase to 3.1% on average by 2021. The EU country with the highest AAL household penetration was Estonia (0.7%) in 2017, expected to grow to 3.5% by 2021. Overall, the average EU AAL household penetration in 2017 was in line with the global average of 0.3%, but it is expected to grow rapidly and overtake the global average by 2021 (1.8% vs 1.3%).

The EU share of the global AAL market is expected to grow from 21% in 2017 to 26% by 2021, according to Statista's Digital Market Outlook (Figure 1). The country with the largest market share is the US, accounting for 60% of the total in 2017 (€539m), reducing to an estimated share of 40% by 2021 (€2,132m). The AAL market in Asia is also expected to grow rapidly from €111m in 2017 to €1,174m in 2021.

In 2017, the penetration of AAL technologies in the household was substantially higher in the US (1.7%) than across the EU (0.3%). It is noteworthy that EU has a relatively heterogenous market, with different health systems, policy systems and legal rules, and a broad range of consumer expectation toward technology and socio-cultural differences. This means that scaling up AAL solutions and expanding across borders will be challenging in the EU and this will require policy changes as well as the development of a more integrated value chain and ecosystem.

Figure 1 AAL market size



Source: data from Statista, Digital Market Outlook. Analysis by Technopolis.

Technological developments expand opportunities for AAL solutions

Rapid technological developments of the various components that make up AAL products have taken place over the last decades. This development combined with the decreasing cost of technologies are a strong driver for creating new services for older people. Products bundled with more adapted services create accessible AAL solutions with multiple benefits for older people.

In particular, technologies that can be integrated in AAL products include *sensor technologies* that provides electronic data; *reasoning technology* that aggregates, processes and analyses data; *acting technology* that executes actions or operate components of the system; *interacting technology* that facilitates human-machine interactions; and *communicating technology* that enables different components of a system to exchange information.

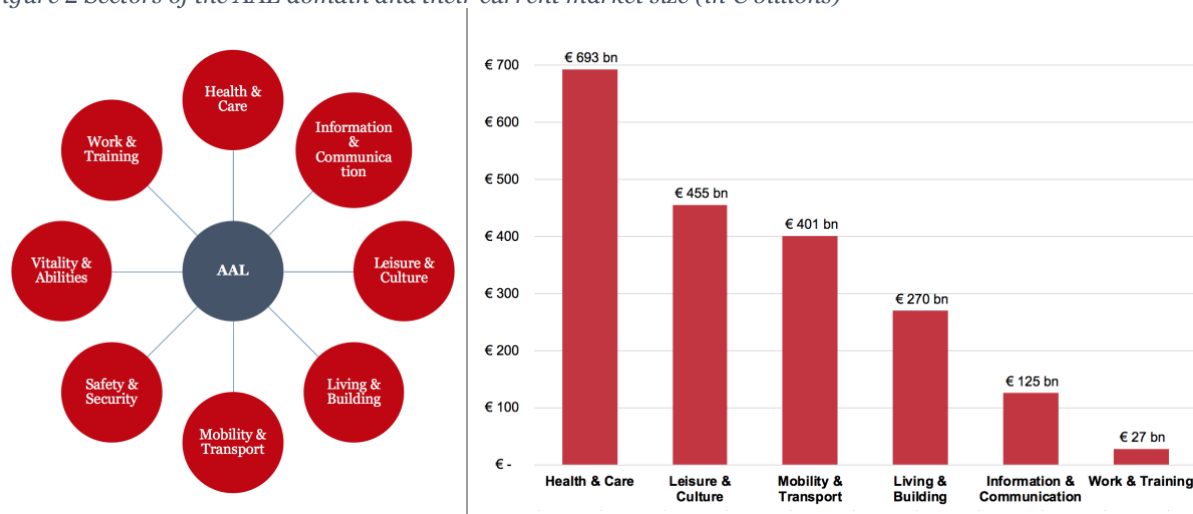
Opportunity areas in the AAL market appear most clearly in the integration of distinct technologies into new and innovative solutions that support services for independent living of older people. These may include:

- Sensors integrated in the home that help ‘unburden’ the health and care sector
- Communication platforms for formal and informal carers
- Solutions to overcome physical limitations of older people
- Solutions to keep older people active and healthy
- Solutions to ‘gamify’ relevant physical and cognitive activities
- Platforms to enable social interaction and access to relevant services.

Sectors of the AAL domain

There is a need for a comprehensive and practical classification scheme that encompasses new and diverse technological areas such as the AAL to discuss and compare AAL products and services in a consistent way. The TAALXONOMY³ project used international definitions and standards to derive various categories, from independent living in the built environment to supporting measures for learning and training, as illustrated in Figure 2. AAL solutions may however cut across multiple industrial sectors to create unique solutions for the older people. Consumption by 50+ EU citizens in these industrial sectors are currently very large and create opportunities for the AAL market overall.

Figure 2 Sectors of the AAL domain and their current market size (in € billions)



Source: EU consumption of the 50+ by sector (Eurostat, 2015). Note that sector classification used by Eurostat does not allow identification of the Safety & Security sector and the Vitality & Abilities sector.

Emerging trends in the Health & Care sector

The Health & Care sector comprises of solutions that collect and manage health-related data, support diagnostic, treatment and care activities, as well as those assisting in nutrition and personal hygiene.

In the EU, the 50+ spend €693b per year in relation to Health & Care, 46% of the total population’s spend (Eurostat, 2015). The biggest component of spending is on food (€408b), followed by spending on personal care (€81b). The highest share (57%) spent by the 50+ population is in the medical products, appliances and equipment category. By 2025 this population segment is expected to spend €1,052b per year, over half of total population spending on Health & Care.

ICT developments have allowed healthcare solution providers and mobile network operators, amongst others, to provide remote monitoring for older people. Generally, these include three main technological components: hardware (sensors and devices), connectivity, and the software (middleware management layer, data analytics, and applications). It is estimated that the introduction of ICT and telemedicine alone will improve the efficiency of health care by 20% (EC, 2016)⁴. As an example, the Scottish Telecare Development Programme⁵ provided telecare services to 44,000 people between 2006 and 2011, and estimated to have reduced the number of emergency admissions to hospital by 8,700 patients and admissions to care homes by 3,800 patients. The telecare services also made it possible to speed up 2,500 hospital discharges.

Based on a survey of health care professionals, it is thought that in EU countries connected care devices are used more often when patients are living with serious or long-term medical conditions in their own homes. In the Netherlands, Sweden and Spain, such devices are used at least sometimes in 70% of the cases⁶.

Emerging trends in the Information & Communication sector

The Information & Communication sector comprises of solutions that present information, offer advisory functions and enable interpersonal communication related to daily living for older people.

In the EU, the 50+ spend €125b per year in relation to telephone equipment, telephone services, and audio-visual, photographic and information processing equipment, 39% of the total population’s spend (Eurostat, 2015). By 2025 the 50+ population spend is expected to increase to €194b per year (42% of total population spending) on Information & Communication.

It is likely that the development of the AAL market for Information and Communication is at a relatively more mature level (i.e. demand for this type of products and services is higher) in countries where older people already purchase telecommunications online. Close to 20% of the 55-74-year-olds in Denmark already purchase telecommunication services online, in contrast to 0% in Romania and Bulgaria (Eurostat, 2017).

Emerging trends in the Leisure & Culture sector

The Leisure & Culture sector comprises of solutions that enable or enrich recreational and cultural activities of older people.

In the EU, the 50+ spend €455b per year in relation to Leisure and Culture, including eating out (€198b), recreational and cultural services (€109b) and accommodation services (€50b), 39% of the total population's spend (Eurostat, 2015). In 2015, the 50+ spent 45% of total population consumption on package holidays. By 2025, the 50+ population is expected to spend €676b per year (42% of total population spending) on Leisure and Culture.

There are a number of online platforms and applications available that aim at improving connectivity amongst older people and will drive stronger demand in Leisure and Culture. In countries such as Denmark, Luxembourg, the Netherlands and Sweden, close to one third of the 55-74-year-old consumer group already purchase leisure and culture services online, including tickets for events, travel and holiday accommodation, and films/music, e-books, e-magazines or computer software such as video games. In contrast, in Croatia, Bulgaria and Romania the share of today's 55-74-year-old consumer group that already purchase leisure and culture services online is below 5%.

The AAL market for Leisure and Culture extends well beyond the delivery of the abovementioned types of platforms. For example, ICT services (monitoring devices) that aid older people to take care of their pets are also part of this category of AAL solutions.

Emerging trends in the Living & Building sector

The Living & Building sector comprises of products and services for water and energy supply, light management, room climate as well as measures for barrier-free living space design.

In the EU, the 50+ spend €36b per year in relation to housing maintenance and repairs, 49% of the total population's spend (Eurostat, 2015). Total spending in this sector, including water charges and electricity, gas and other fuels of the 50+ is €270b, which is estimated to rise to €429b by 2025.

The smart home market is one of the larger digital markets that is closely related to the Living & Building sector, targeting all citizens including older consumers. Smart home technology is expected to be adopted by (on average) 20% of households in the EU by 2021, a steep increase from 2% in 2017. In the UK, Germany, Finland, Sweden, Estonia, and the Netherlands more than 30% of households are expected to have adopted smart home technology by 2021.

The EU smart home market, including AAL solutions, is estimated at €4,681m in 2017 and is expected to grow to €16,508 by 2021 (Statista, Digital Market Outlook for EU24) The global smart home market value (also including AAL solutions) was over €23b in 2017 and is expected to grow rapidly to more than €74b in 2021. These estimates are in line with those of PWC⁷ that predict the global smart homes market will be worth more than €55b by 2020. The rapid growth in the smart home market is currently based on growth in the delivery of energy management services and security and safety services. The success of the smart home market will drive the AAL market for older people as both require similar technological base with potential for implementing innovative solutions in the built environment. There are indications that independent living solutions will in future be delivered through energy companies with smart energy solutions, such as Hive from Centrica Connected Home.⁸

One example of a smart home product that specifically target the older consumer group is KemuriSense smart power sockets, which contain passive sensors that continually measure temperature, humidity,

electrical power usage, motion and power supply. The app screen of this product shows colour-coded changes to patterns of activity that could indicate the risk of hypothermia, dehydration, malnutrition, power loss and unattended falls⁹. Smart power sockets can be fitted in the kitchen of older people living alone to measure ambient conditions and the use of electrical devices such as kettle or microwave oven. The wellbeing monitor analyses the data hourly to identify unusual pattern of activity that could indicate a problem, possibly alerting families to take preventive action.

Emerging trends in the Mobility & Transport sector

The Mobility & Transport sector comprises of solutions that serve as transportation measures, as well as, offer travel information, navigation and orientation solutions, relevant for older people.

In the EU, the 50+ spend €401b per year in relation to purchase of vehicles, personal transport running costs, and non-personal transport services, 38% of the total population's spend (Eurostat, 2015). By 2025, the 50+ spending in this sector is expected to increase to €584b, 41% of total population spending.

A number of products and services use acting technologies to aid older people getting about. One such example is the 'Smart Cane', which can detect any unusual situation (e.g. fall detection, lower activity) and can alert caregivers and family if needed¹⁰. Another example is 'Path Finder', a shoe attachment that provides visual cues to help people with unsteady and irregular gait.¹¹ Other developments in the market include exoskeletons that are designed to help people with mobility disorders to be upright and mobile (e.g. PhoeniX Exoskeleton and Honda Walking Assist)¹². Many of these technologies will be integrated into the transport system of 'smart cities', to the benefit of older people.

Emerging trends in the Safety & Security sector

The Safety & Security sector comprises of solutions that prevent damage and burglary or support the older people in case of fall. One element of this category is providing safety and security at home environment as well as in residential care setting.

It is estimated that in 2018 the global security market (including demand from younger and older people) is €8.2b and that it will grow to €20b in 2022 (Statista, Digital Market Outlook). These include digitally connected and controlled devices for burglar prevention and other security issues; motion sensors, door locks, security cameras; surveillance services with connection to a broader smart home; and hazard prevention devices like water, smoke or gas sensors.

The AAL market specifically focuses on a range of products for fall prevention and this market is growing as formal and informal carers are looking for new ways to ensure the safety of older people. There are estimates on the cost of falls to the health system, and reducing fall or reducing the time between fall and hospitalisation can substantially decrease the overall cost¹³. Fearless¹⁴ is an example of an intelligent, contactless fall sensor that not only detects falls, but also helps to prevent them, based on 3D sensors and smart behaviour modelling algorithms. Fearless is already in use in nursing homes, assisted living facilities, retirement homes and smart home facilities.

Another example is Ubiquid¹⁵, which transforms clothes and valuables of residents in retirement homes into connected objects. Thanks to radio-frequency identification tags, Ubiquid allows objects to be identified and localised. Users benefit from peace of mind, knowing that their belongings will not be lost; employees in retirement homes can focus on other key activities; and managers can monitor metrics through online dashboards, thereby improving overall efficiency of operations.

Emerging trends in the Vitality & Abilities sector

The Vitality & Abilities sector comprises of products and services that support, train or enable basic physical, mental and social abilities that are essential requirements for independent living. Many of the technologies in this sector build on apps and wearable devices to collect and analyse relevant data. Wearable devices can be used for wellness, sport and fitness applications, communications and lifestyle applications. The global digital 'fitness' wearables and apps market is estimated to grow from €5.3b in

2017 (€3.2b for the wearables market and €2.1b for the apps market) to €9.1b in 2021 (Statista, Digital Market Outlook). By 2021, the EU digital ‘fitness’ market is estimated to amount to almost €1.7b. Application areas and examples of products and services on the markets are:

- Physical Abilities – e.g. Pepper¹⁶, a humanoid companion created to communicate through body movement and voice. Pepper is designed to interact, and can dance, play or even chat in different languages. Pepper gradually memorises the users’ personality traits and preferences and adapts to the different tastes and habits.
- Cognitive Abilities – e.g. Memrica Prompt¹⁷ a free software that emulates the way memory works to help older people living with memory problems make the most of each day. The app creates contextual records of shared history with family, friends and places to help users prepare for social events and journeys.
- Social Skills – e.g. Storyville Studios¹⁸. A platform for picture-based games strengthening social connections through storytelling.

Emerging trends in the Work & Training sector

The Work & Training sector consists of work supporting measures and products and services for job specific learning and training for older people. In the EU, the 50+ spend €27b per year in relation to education, 28% of the total population’s spend (Eurostat, 2015). By 2025, it is estimated that the 50+ will spend €41b on education, 29% of total population spending.

The e-learning market in particular is a growing market, although it is developing more rapidly amongst the 30-50-year-old consumer segment. The e-learning market is relatively more developed in Luxembourg, the Netherlands, and the UK, where up to 5% of the 55-74-year-old purchase e-learning materials online (Eurostat, 2017).

What drives the growth of the AAL market?

The ratio of people in the EU that are aged 65 or above compared to the people aged 15-64 is expected to increase from 28% in 2015 to 50% in 2060. On average, healthcare consumption increases with age, for example, individuals aged 50+ accounted for almost 70% of all in-patient hospital days in 2013, despite being 40% of the total population. As a result, the number of people aged above 65 that will need (long-term) health and care services will increase substantially in the EU over the next decades and this puts direct pressure on the public health system. The social care sector is also under pressure because older people are generally more restricted in their physical and cognitive abilities, and often need additional support and assistance in daily tasks¹⁹. ICT-based solutions can help older people to live longer and happier, independently in their own homes.

A specific challenge to old age is dementia and almost 6% of the EU population over 60 years of age suffer from the disease. Prevalence of dementia increases exponentially with age and it is estimated that the number of people living with dementia will increase from 10m in 2015 to 13m in 2030 and 19m in 2050²⁰. Depending on the severity of the symptoms, individuals need varying levels of support. People with severe dementia symptoms can often not live on their own. In addition to affecting the person living with the disease, dementia also impacts on the quality of life of family members who provide care.

There is a political awareness that the health and care systems could integrate technology better to help improve the efficiency of services delivered, without compromising on quality. AAL solutions often need to be adapted to the local and national health and care system where the services are deployed. The telecare market is largely driven by the public sector in Germany, France, Spain, Sweden, and UK, whereas in the Netherlands, the market is largely driven by private investment²¹.

How will consumer interest grow in AAL solutions?

There has been increased interest in healthy ageing and in self-health management across the society and policy initiatives. The availability of activity trackers and medical sensors embedded in consumer

devices, primarily wearable devices and smartphones, has had positive effects by these devices enabling (amongst other) health and lifestyle monitoring. The rise of the ‘quantified self’ movement, measuring individual’s vital data using everyday devices, has shown consumers how accessible technology can be used in a new way beyond voice, messaging, and internet surfing. This movement has also enhanced consumer awareness about healthy behaviour and lifestyle.

Internet usage amongst the older population is also increasing rapidly. In 2007, only 16% of the 65-74-year-olds used the internet, whereas by 2016 this has increased to 49% (EU28, Eurostat). Smart phone penetration in Europe was close to 67%, however those aged over 55-74 lag behind and varies significantly across countries. Recent data from the US shows that the smart phone penetration is increasing fastest among older people and this creates optimism for the EU market.

Older people are also becoming familiar with the use of smart TVs; in 2016, 3% of the 65-74-year-old population used a smart TV, and 5% of the 55-74-year-old used a smart TV (EU28, Eurostat). Telecare penetration has increased amongst the older population; for example, in the UK about 32% of the 75+ are subscribed to telecare assistance.

There is an increase in the use of ICT not only in private homes but also in the health and care system. For example, many general practitioners have adopted the use of electronic networks to exchange medical patient data with other healthcare providers and professionals and to transfer prescriptions to pharmacists. Increasingly, citizens have access to their electronic medical records and have control over those. For example, Finland uses Kanta to exchange electronic patient records, while Austria has introduced the ELGA system.

What are the key barriers to growth?

The complexity of the regulatory environment, in combination with the need for interoperable solutions, common standards and data sharing, is one of the key barriers in expanding the AAL market²². Health and care falls under the national and local jurisdiction in EU countries. From a commercial point of view, a key challenge is that an AAL device or solution needs to be certified in the country of use, as there is no overarching legislation applicable across the EU. This represents a substantial cost for developers of AAL solutions, particularly for start-ups.

Interoperability – the ability to integrate and share data across devices – is also a key concern. The lack of interoperability and the availability of large number of solutions from different vendors represent a significant barrier, particularly in smart home environments, where there are various communication protocols currently in use. There is a strong effort from the industry and standardisation bodies to bring formats and protocols together. UNIVERSAAL²³ is an example of an interoperable platform, however, the actual adoption of standardised protocols can take a long time for companies. Greater interoperability across devices, services and systems will be needed to see the emergence of connected health care systems, which link providers with the wider population and particularly older people and their carers. Differing standards hinder the implementation of AAL solutions and limit their scaling up nationally and across the EU and to reach economies of scale.

There is also uncertainty about the future price and take-up of AAL solutions, which very much depends on how the solutions will be introduced to the market, their degree of interoperability, and the value it creates. Users of the AAL solutions and the payers of these solutions are often different entities. Older consumers and family members are often reluctant to pay for AAL solutions, expecting the public sector to provide services related to telehealth and telecare. However, current reimbursement systems make it difficult for the private sector to develop viable business models for their services. There will be less space for private-led initiatives if the complementarity between public and private incentives is not well aligned.

Who are the big players in the AAL market?

The AAL market includes key industrial players such, as Televic (Belgium), Vitaphone (Germany), Siemens (Germany), Schneider Electric (France), Legrand (France), Telbios (Italy), Philips

(Netherlands), CareTech (Sweden) and ABB Group (Switzerland). Many of these larger companies actively patent technologies relevant to the AAL domain.

For example, Philips is focussing on healthcare, lifestyle and lighting. It integrates technologies and design into people-centric solutions. The convergence of their consumer technologies and increasingly digitalised health systems will enable integrated solutions that will ease constraints on health systems while creating value for Philips stakeholders.²⁴ Philips runs a SimplyInnovate program to help innovators bring their new technologies to the market. Philips also has a substantial portfolio of intellectual property (IP), covering 79,000 patent rights, 49,000 trademarks, 86,000 design rights and 4,400 domain names.²⁵

Tunstall Healthcare is a European leader for technology-enabled healthcare solutions. Tunstall offers hardware and software solutions, and manufactures and distributes electronic products for healthcare services. Their telehealth systems provide patients with the means to monitor their vital signs and symptoms at home, supporting the delivery of effective healthcare in the community.²⁶ Tunstall also focuses on healthcare solutions for older people and those with long term needs to enable dignified and independent living.

Who are the investors in the AAL market?

There is an increasing awareness among venture capital (VC) investors about AAL solutions and the older people as a significant consumer segment. Technology-focussed investment companies and industrial investors (both technology and telecom companies) scout the market for new ideas.

KPN Ventures, the venture capital investment arm of KPN, is a leading telecom & ICT service provider in the Netherlands. They invest capital and enable access to KPN's infrastructure, security, connectivity and related technologies directly and indirectly in companies who have innovative products and business models. KPN Ventures invested in 2017 in an intelligent care monitoring solution Sensara²⁷, a spin-off from the AAL project Rosetta²⁸.

An example of a European VC firm is the Belgian-based Capricorn Venture Partners with several capital funds investing in areas related to biotechnology, big data, clean technology and digital health care. Their Capricorn ICT fund is worth about €30m, and for many years it has looked towards active ageing as a new line of investment.

Private banks and insurance providers also support new and innovative companies in the AAL market. For example, the insurance company BUPA invests in retirement housing and assisted living properties.²⁹

A number of start-ups are (partly) self-funded and some AAL start-ups have benefitted from crowd funding such as Kickstarter and Indiegogo. Such platforms facilitate global reward-based crowdfunding, a way to source funding without parting with equity. By requesting a large number of individuals to pledge relatively small amounts of money, start-ups can gain capital from numerous backers in return for tangible rewards/and or experiences.

Considering the portfolio of investment made in 2016 in personal health management and health care services and smart homes, as tracked by Tracxn Technologies, average seed investment is just over €1m. Average Series A investment in personal health management and health care services was about €11m and Average Series A investment in the smart homes sector was just over €6m. Series B investment was around €16m. The vast majority of the funded companies are however based in the US. Examples of a Series A companies relevant to the sector in Europe are Keecker (France)³⁰ providing smartphone controlled robot projectors, and Sense (UK) developing device to monitor appliances and track energy usage. In terms of series B investment, Netamo (France) provides a thermostat, video monitoring and personal weather station and air quality sensor devices for use with Android and iOS apps.

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