FAKULTÄT FÜR !NFORMATIK
Faculty of Informatics

# AAL Economy Compass

## Analysis of the economic potential of Ambient Assisted Living projects/products in Austria

DIPLOMARBEIT

zur Erlangung des akademischen Grades

**Diplom-Ingenieurin**

im Rahmen des Studiums

**Wirtschaftsinformatik**

eingereicht von

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MASTER'S THESIS

submitted in partial fulfillment of the requirements for the degree of

**Diplom-Ingenieurin**

in

**Business Informatics**

by

**Stephanie Kühnl**
Registration Number 0725254

to the Faculty of Informatics
at the Vienna University of Technology

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Vienna, 23.07.2013

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# Abstract

The population of Austria is getting older. Due to this demographic ageing a lot of work is done in the area of Ambient Assisted Living (AAL). AAL includes technical resources that enable older people in need of care to live independently in their own homes. Therefore, it is of interest which economic benefits Austria could have through the use of Ambient Assisted Living. One aim of this thesis is to show this benefits. For this, informations about care costs in Austria will be gathered and a survey is made to get information about companies and their Ambient Assisted Living projects and the costs related to the development of these projects.
After an analysis of the collected information with regard to the benefit for Austria, it can be seen that there are major possible savings through the use of Ambient Assisted Living. Due to the fact that the change of living environment could be postponed for over one year, the independent life of people in need of care is extended. Thus, Austria can save a lot of financial support.
The other aim of the theses was to create a single point of resource. A database has been extended to contain all gathered information about the AAL projects.

# Kurzfassung

Die Bevölkerung von Österreich wird immer älter. Aufgrund dieser demografischen Alterung wird viel im Bereich Ambient Assisted Living (AAL) gearbeitet. AAL umfasst technische Ressourcen, die es älteren betreuungsbedüftigen Menschen ermöglichen unabhängig in ihren eigenen vier Wänden zu leben. Daher ist es von Interesse, die wirtschaftlichen Vorteile für Österreich durch den Einsatz von Ambient Assisted Living zu betrachten. Ein Ziel dieser Arbeit ist es diese Vorteile zu zeigen. Dafür werden Informationen über Pflegekosten in Österreich gesammelt und eine Umfrage wird durchgeführt, um Informationen über Unternehmen und ihre Ambient Assisted Living-Projekten und die Kosten im Zusammenhang mit deren Entwicklung zu bekommen. Nach Analyse der gesammelten Informationen im Hinblick auf den Nutzen für Österreich, kann man sehen, dass große Einsparungen durch den Einsatz von Ambient Assisted Living möglich sind. Aufgrund der Tatsache, dass die Veränderung der Lebensbedingungen für über ein Jahr nach hinten verschoben werden könnten, wird das selbstständige Leben der betreuungsbedürftigen Menschen verlängert. Dadurch kann Österreich viel Geld im Bereich der finanziellen Unterstützung sparen.
Das andere Ziel dieser Arbeit war, einen zentralen Anlaufpunkt für AAL zu schaffen. Um dies zu erreichen, wurde eine vorhandene Datenbank erweitert und die gesammelten Informationen über die AAL-Projekte wurden in diese eingefügt.

# Contents

CHAPTER 1

# Introduction

## Problem statement

Austria goes through a demographical change. The population of Austria is getting older. Due to this development a lot of research and work is being done in the area of Ambient Assisted Living (AAL). Ambient Assisted Living [GEO2008] includes technical resources that enable older people in need of care to live independently in their own homes.

In Austria there are currently a number of companies that are working on projects, products and services in the field of Ambient Assisted Living. The problem is how to find these projects. In Austria there is no single resource where you can get information about AAL projects.

Thus, the aim of this work is to link the various companies with their AAL projects and to create a database which represents a point of contact. Because of the increase in the ageing population and their health care costs, the economic benefits for Austria, by using and exploiting AAL projects, will be discussed.

## Aim of the work

The expected result of this work is a database which represents a single resource for companies dealing with AAL projects and to answer the following questions:

- What is the expected economic benefit to Austria by these AAL Projects?
  - Costs incurred for care
  - Savings through the use of AAL projects/products
  - Costs for development and exploitation of AAL projects
- What are the benefits of networking between companies that deal with AAL projects?

## Methodological approach

Based on an existing survey [TUW2011] a single point of contact is provided. A database which contains the collected information about the different AAL projects/products of the different companies was created. This database is integrated into a web application.

A literature research is done on the following topics:

- The Austrian population trends
- Ambient Assisted Living
- How can the quality of life be defined?
- How can the level of care be defined?
- Average care costs of people in need of care per month/year
- The economic benefits of AAL projects for Austria

Then, an online survey was created, which was sent to the different companies that are working on projects in the field of AAL. This survey is to clarify the purpose of the following points:

- How do their AAL projects/products help people in need of care to live longer independently in their own homes?
- What is the opinion of the company regarding the gain in time that people can live independently at home with the help of their project/product?
- How does their AAL project/product affect the quality of life for the older people?
- The need and the benefits of a single point of contact for AAL projects/ products is requested.

Finally, the results of the literature research and the survey will be used to analyse the economic impact for Austria caused by the use of AAL projects/ products. They will also be used to show which benefits the participating companies can get from the creation of a single point of contact in the form of the database.

## Structure of the work

At first some background about the Austrian population trend and its reasons, Ambient Assisted Living and the quality of life is given. Then the care system in Austria with the different forms and levels of care is analysed.
The following chapter is about the survey. It is described which questions have been asked and why and the results of the survey will be shown.

After that the economic benefits of Ambient Assisted Living projects for Austria are described, based on the information gathered through the survey.
A description of the web application follows. Also the structure of the code and database is explained.
Finally, the work is summarized in the conclusion.

CHAPTER 2

# Background

## 2.1 Austrian population trend

### 2.1.1 Demographic change

Due to improved health care and living conditions, and the absence of life threatening danger to the public, such as wars, as well as afford- and accessible education for everyone a trend can be assessed concerning the aging of the Austrian population.

Taking a closer look at Statistics Austrias' [STA2012] ascertainment since 1952 and forecast until 2075 one can easily discover the direction in which aging will evolve. In the left part of figure 2.1 the changes in the number of people from 60 years upwards till age 74 is documented since 1952 and statistically computed until the year 2075. The population of this age group in the year 1952 counted approximately 0,85 million people and developed to 1,19 million until the year 1975 where a slight decline happened, as consequence of the birth deficit during and after World War 1 and the Great Depression of the thirties, to about 1 million older people. Since 1997 the group aged 60 to 74 years has again steadily grown and prognoses show that in 2030 it will reach its peak at roughly 1,8 million people, which is an accretion of one million in the last 78 years.

In the right part of figure 2.1 it can be seen that the changes in the number of people aged 75 and older has continually risen from 0,2 million people in 1952 to 1,78 in 2044. An increase of around 1,58 million people in one century!

While the older population steadily grows in number and will continue to do so, the birth rates have decreased since the sixties. In the following table (Table 2.1), which shows the population prognoses of the years 2011 to 2060, the shift from a nation with many young catering to the needs of the old to a nation with ever sinking numbers of youths struggling to support the growing mass of older people and themselves can be perceived.

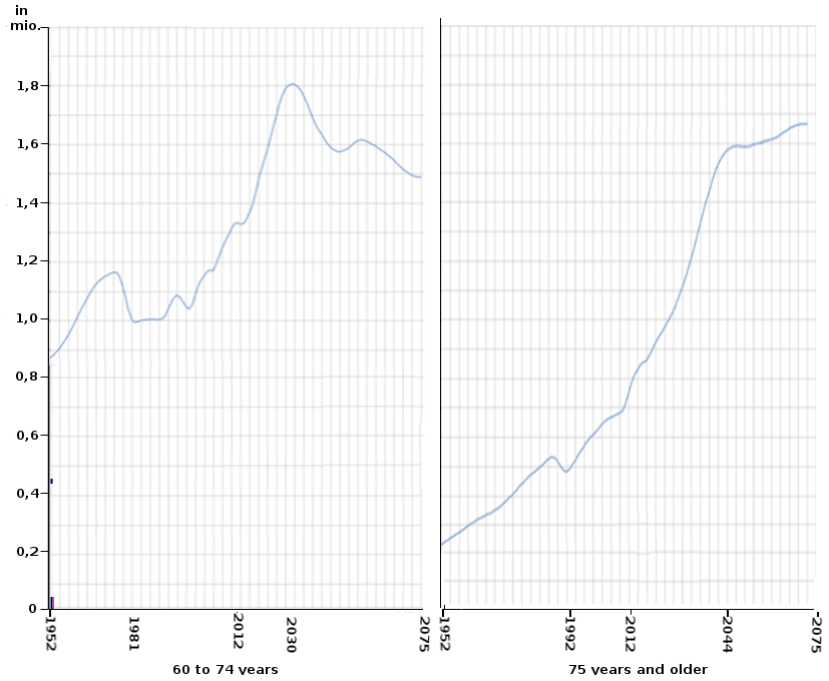


Figure 2.1: Austrian population at the beginning of the year 1952 to 2075 [STA2012].

### 2.1.2 Reasons for this trend

Statistics tell us that in the sixties an average of 140.000 babies were born annually compared to 80.000 babies in 2011.

Children born in the 50ies and 60ies are called generation-baby-boom, because during this time an economic revival happened. Back then it was still common for women to stay home, family and children were among the greatest values to aspire. Since then, values changed. We became a consumer society and due to many working women new definitions of family and family life formed. Today the generation-baby-boom are grown ups, aged between 40 and 60. It is them that define our values and standards. They know they can make change happen. Simply due to their mass.

In 1985 the average number of children per family was 1,82 (statistically speaking), in 2011 this number decreased to 1,68 which emphasises the fall in family value.

Also the number of couples without children has risen since then. In 1985 there were about 45.000, in 2012 this number increased to 194.000 childless couples, which includes not only married ones but also people living in a consensual union.

In table 2.1 the distribution of people based on their age can be seen. In the sixties was the

| Austrian population prognoses of the years 2011 to 2060 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Age group (years)** | **2011** | **2015** | **2020** | **2025** | **2030** | **2035** | **2040** | **2045** | **2050** | **2060** |
| 0 to 5 | 393.533 | 403.843 | 415.619 | 421.774 | 420.419 | 414.518 | 411.374 | 413.620 | 419.246 | 428.003 |
| 5 to 10 | 405.318 | 402.847 | 412.523 | 423.849 | 429.761 | 428.408 | 422.662 | 419.588 | 421.759 | 432.629 |
| 10 to 15 | 430.557 | 415.201 | 412.572 | 421.682 | 432.711 | 438.440 | 437.066 | 431.397 | 428.374 | 435.806 |
| 15 to 20 | 492.093 | 458.087 | 432.754 | 429.433 | 438.247 | 448.936 | 454.479 | 453.089 | 447.535 | 446.635 |
| 20 to 25 | 526.801 | 540.870 | 502.528 | 477.318 | 473.970 | 481.983 | 491.706 | 496.702 | 495.329 | 487.449 |
| 25 to 30 | 555.882 | 558.093 | 572.296 | 536.770 | 514.245 | 511.089 | 517.991 | 526.522 | 530.889 | 525.032 |
| 30 to 35 | 538.129 | 573.827 | 574.003 | 586.313 | 554.187 | 533.676 | 530.769 | 536.891 | 544.578 | 547.382 |
| 35 to 40 | 574.458 | 542.109 | 582.623 | 584.078 | 595.490 | 565.709 | 546.565 | 543.893 | 549.547 | 560.401 |
| 40 to 45 | 685.568 | 600.593 | 552.044 | 590.943 | 592.302 | 603.208 | 575.123 | 556.996 | 554.559 | 566.851 |
| 45 to 50 | 712.845 | 699.125 | 603.521 | 556.966 | 594.357 | 595.835 | 606.499 | 579.832 | 562.632 | 565.790 |
| 50 to 55 | 623.529 | 694.517 | 689.353 | 598.558 | 554.421 | 590.684 | 592.480 | 603.128 | 577.870 | 559.868 |
| 55 to 60 | 513.329 | 589.692 | 676.356 | 672.778 | 587.226 | 545.723 | 581.196 | 583.585 | 594.427 | 555.538 |
| 60 to 65 | 481.417 | 479.871 | 568.030 | 652.067 | 650.450 | 570.611 | 532.105 | 567.135 | 570.408 | 559.696 |
| 65 to 70 | 410.087 | 437.746 | 456.711 | 542.041 | 623.654 | 624.447 | 550.592 | 515.383 | 550.321 | 566.864 |
| 70 to 75 | 398.963 | 409.644 | 407.828 | 428.044 | 510.375 | 589.655 | 593.196 | 525.802 | 494.297 | 535.259 |
| 75 to 80 | 263.278 | 320.150 | 363.123 | 366.672 | 388.648 | 467.248 | 543.721 | 550.788 | 491.672 | 500.605 |
| 80 to 85 | 218.354 | 213.299 | 261.614 | 299.082 | 309.118 | 332.567 | 405.383 | 477.421 | 488.984 | 421.724 |
| 85 to 90 | 141.102 | 142.459 | 143.332 | 183.669 | 212.096 | 227.442 | 250.251 | 311.907 | 374.453 | 358.154 |
| 90 to 95 | 43.833 | 64.355 | 67.627 | 70.197 | 96.196 | 111.286 | 125.843 | 142.526 | 183.153 | 240.634 |
| 95 and older | 10.824 | 11.610 | 18.721 | 20.721 | 22.134 | 31.749 | 36.646 | 43.634 | 50.871 | 83.931 |
| **Total** | **8.420.900** | **8.557.938** | **8.713.178** | **8.862.955** | **9.000.007** | **9.113.214** | **9.205.647** | **9.279.839** | **9.330.904** | **9.378.251** |

Table 2.1: Austrian population prognoses of the years 2011 to 2060 [STA2011a].

last baby boom in Austria. Since then we have a declining birth-rate. Today the people born in the time of the last baby boom are aged between 40 and 60, this has a big impact on the numbers in the forecast of the older population.

In figure 2.2 the distribution of people based on their age and the reasons for the number of people born in a specific time period can be seen.

As a consequence of the declining birth-rate the number of working people will decrease in the future. In combination, the decrease of the working people and the increase of older people in need of care can result in financial problems in the area of care [STA2013b]. Increasing so called ”Depndency Ratio”.

## 2.2 Ambient Assisted Living

Due to this development a lot of research and work is being done in the area of Ambient Assisted Living (AAL).

Ambient Assisted Living includes technical resources that enable older people in need of care to live independently in their own homes. This includes concepts, products and services with aim to better and safeguard their quality of life with the help of information- and communication technologies [GEO2008].

With the help of AAL an intelligent environment can be created which supports people in need

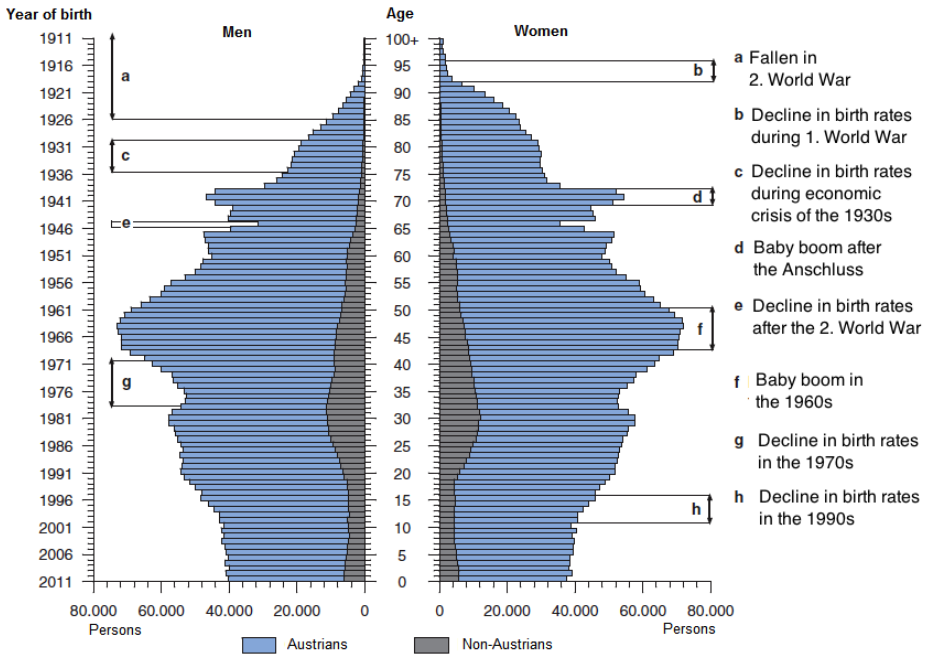


Figure 2.2: Austrian population 2012 [STA2012].

of care. The use of Ambient Assisted Living systems should be subtle and intuitive. The user should not have to learn how to use the system and there shouldn't be a large impact on the daily routine of people in need of care.
Often these systems need to be personalised and specifically constructed concerning the needs and abilities of older people, as requirements can significantly vary from one person to another. The main goal of Ambient Assisted Living systems is to enable people to keep or regain their independence. Also the quality of life of the person concerned should be increased by Ambient Assisted Living systems.

Hence, after the next section a definition for quality of life will be outlined as well as a summary concerning the needs of older people.

### 2.2.1 Field of application in AAL and examples

In which fields of application can Ambient Assisted Living improve the quality of life?

- Increase of living comfort
- Security and safety

- Social integration
- Communication

Ambient Assisted Living applications can be simple night light controls, fall detection systems, emergency call systems. Additionally, also modern interactive systems connected to social media can improve the quality of life.

A good example for Ambient Assisted Living technology is a tele-monitoring system which can help to relieve illnesses and prevent secondary diseases. For this, a base-station is needed which in turn is connected to the patient. It records measured data and sends them to the hospital where the data are evaluated by a doctor and a fitting therapy is prompted [AAL2013].

Also sensor technologies are an important part of Ambient Assisted Living. Sensors can help to monitor people in need of care in a subtle way. A lot of different sensors are available and useful, like motion sensors, fall sensors and pressure sensors.
With the help of motion sensors an alarm signal can be sent if a person is motionless for a certain amount of time.
Pressure sensors can be used in intelligent carpets which send for help if an older person has fallen down.
It is also possible for sensors to be in textiles for monitoring heart rate, body temperature and lung activity. If the measured values cross predefined boundaries a signal for help is sent.

The automation of daily routines is also a part of Ambient Assisted Living. Taking a closer look at a typical leaving the house scenario shows that there are important checks everybody does before going out.

- Are all windows closed?
- Is the back-door locked?
- Are all lights switched off?
- Are all devices switched off?
- Lock the door

Older people tend to forget things sometimes. For their security it would be best to automate this process! If they leave and lock the door behind them all windows will automatically close too, all doors leading outside will lock themselves and all lights and devices automatically switch themselves off. With this automation several life and home threatening scenarios can be prevented.

However, one has to be careful when using Ambient Assisted Living as it is of course the wish to assist in every possible way but the privacy of the party concerned should be considered. People in need of care should not feel that their right for privacy has been traded for their security and

hat their home is trying to take all their simply daily routine tasks away from them. Therefore, visual monitoring should be avoided while other options are available. Concerning the security of personal data, highly efficient protection is needed to keep people's private information that way, private!

### 2.2.2 Ethical concerns regarding privacy associated with AAL

In [ZAG2008] some of the concerns regarding the conflicts between technology, acceptance, ethics and privacy are discussed.
It was noted that it is very important to respect the privacy of older people and not to introduce a total monitoring like "Big Brother" in their homes. Thus, only non-invasive sensors should be used, that means no cameras or microphones. Another important point is that collected data about a person should only be processed locally, so that no information about the person can get out and be used in a way the customer does not agree with. This is bypassed only in critical situations to summon help. It should be made clear what the used systems and sensors do. Transparency of the system is necessary so that the older people feel comfortable with it.

Recapitulatory, it can be said that Ambient Assisted Living will become more important in the upcoming years as the population will grow older and fewer and fewer young are going to support an ever growing population of older people. Moreover, security measures need to be taken to prevent theft and misuse of private and personal medical data.

## 2.3 Quality of life

Now let's have a look at the quality of life, which could be improved with the help of Ambient Assisted Living. The wellbeing of the older people is important and this wellbeing can not only be defined by their health. Different factors have to be considered. These factors can be called the quality of life.

### Definition of Quality of Life

Quality of life is not easy to define. A lot of different definitions are out there. Thus, some of these definitions will be looked up and out of them the most important parts are taken and summarised.

[EME1985] defines the quality of life "as the satisfaction of an individual's values, goals and needs through the actualisation of their abilities or lifestyle". This definition is a good one because it takes into account the abilities of the individual and their different lifestyles. Not everyone has the same opinion regarding the importance of different things in their life. In [FEL1995] a thorough research was made to define the quality of life. Out of 15 resources the following domains relevant to quality of life were filtered out.

- Physical wellbeing,
- Material wellbeing,
- Social wellbeing,
- Emotional wellbeing and
- Development and activity.

These domains consist of different parts which are shown in figure 2.3 The information of this figure is based on different papers. A list of these papers can be found in appendix A. Let's have a look at figure 2.3, where the different domains and what they are made of are shown.
As can be seen, the physical wellbeing consists of health, fitness, mobility and personal safety . The material wellbeing consist of the finances, housing quality, privacy, neighbourhood, transport, possessions, meals/food, stability and security. Whereas the social wellbeing can be split into interpersonal relationships like the family life, relatives and social life and into community involvement like activities and events and acceptance and support. The emotional wellbeing can be divided in self-esteem, faith/belief, fulfilment, satisfaction, status/respect and positive affect. The domain development and activity consists of competence/independence, job, home life/-housework, leisure/hobbies, education, choice/control and productivity/contribution.

All of these points are important in the life of people, some of them more than others. Therefore, it is necessary to pay attention to the opinion of the older people and consider the following questions. What do they think is important for their life? How do they perceive the importance of the different points of the quality of life? What is mostly important to them in their daily life?

In the paper [GAB2004] interviews with older people in Britain, aged between 65 and 80, were made regarding their opinion of their quality of life. For this they made a national interview survey, which was called the "Quality of Life Survey", and following this survey in-depth interviews with some of the respondents were made to bring clarity to some questions.
The outcome of this interviews show that for the older people their social relationships, home and neighbourhood, psychological wellbeing, other activities done alone, health, social roles and activities, financial circumstances, independence and mobility are important. Now we will look closer at the quality of life aspects mentioned before.

**Social relationships** with family, friends and neighbours are very important to older people. They appreciate the feeling that somebody cares about them and that they have people to talk to so that they don't feel lonely. Also the contact with grandchildren has a positive effect. Most of the older generation feel happy, to see their grandchildren be happy and feeling loved by them. It was also mentioned from the older people that not all relationships have a positive effect on their quality of life. For example, relationships in which the older people have to worry about their children whether because of financial problems or health problems. Then they want to help their children and this has a negative effect on their quality of life. The value of social relationships mentioned by the people asked were the prevention of loneliness, the need for

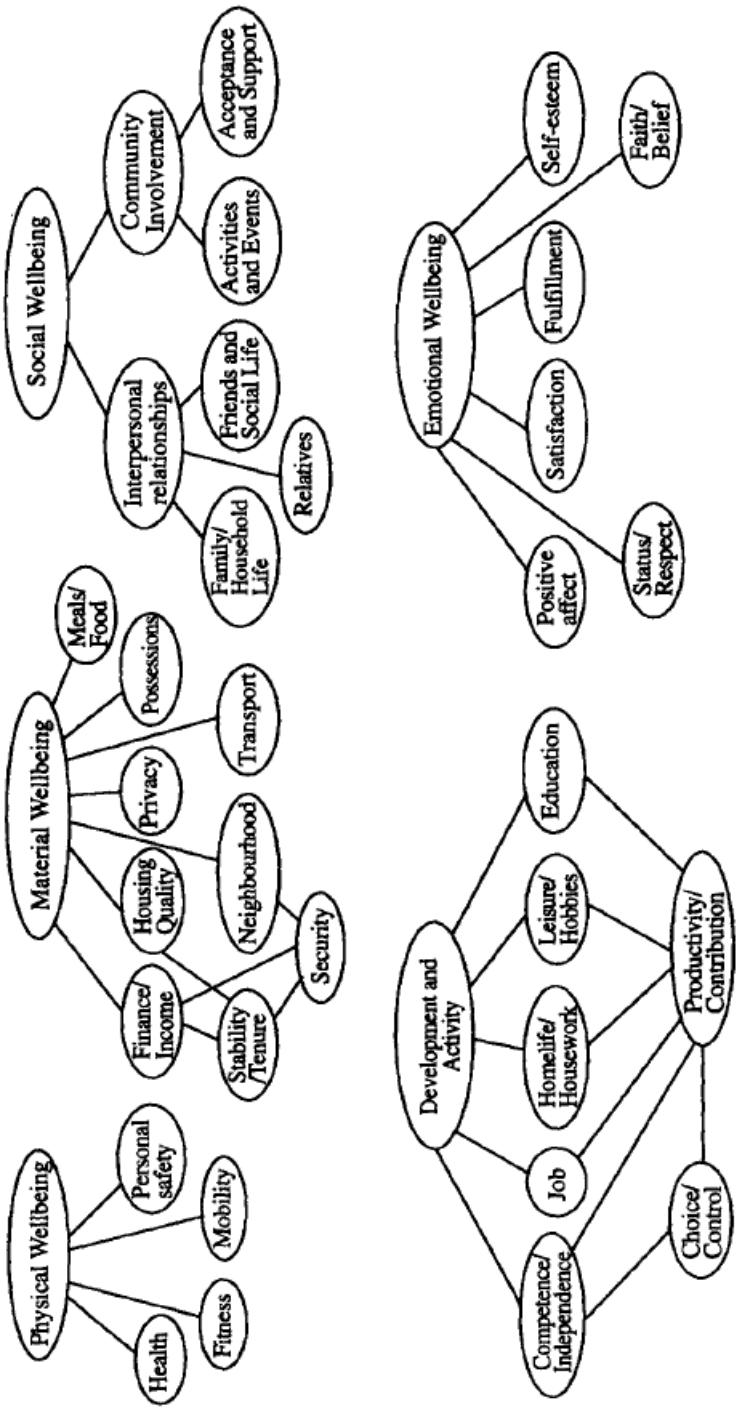


Figure 2.3: Domains relevant to quality of life. From the paper [FEL1995] and based on: Appendix B

correlative emotional support, having someone to talk to, to provide advice, feeling cared for and people to call on for help.

**Home and neighbourhood** is another important factor mentioned by the older population. To have nice neighbours to talk to or to get help from in emergencies, has an impact on the quality of life. Good facilities and local services are also important. If the environment is good, in the way that important places like shops, post-office, health services, bus stops, educational and exercise facilities etc. are nearby or easily to reach, then the quality of life for the older generation improves. A good public transport system is also mentioned as important, which should be accessible and affordable.

**Psychological wellbeing** is seen as the interpretation of situations by older people. A positive mindset and 'taking each day as it comes' and not worrying about the future is important. Being optimistic in life, being content, looking forward to things, keeping busy and accepting situations is important to have a good quality of life. This is something that depends on the individual and, therefore, can not be measured easily.

**Social activities and hobbies** are important in the way to keep busy. It is mentioned that some older people perceive old age as a time to learn new skills or going on holiday. This is important for people to obtain an interest in life.

**Health** has a huge impact on the quality of life. Having good health is important because without that one is restricted. Not being fit enough to do what one wants to do and to have to give up activities is one of the worst situations for older people.

**Financial circumstances** are relevant because the older people need to have enough money to pay bills and not to have to worry about money. They want to be able to afford to do the things they enjoy doing. For a lot of things money is required, for example if one likes to go to the cinema or theatre.

**Independence and mobility** goes hand in hand. Mobility is important because it is part of the independence of people. If ones mobility is limited then one is restricted and more help is needed. It is important for people to do things independently and to have the freedom to do what they want, when they want and where they want. A lot of older people say that having a car gives their lives quality. With a car they didn't have to rely on public transport or on lifts from other people. Because of this they feel more independent and this enhances their quality of life.

Considering the quality of life domains mentioned above (see figure 2.4), the important factors for older people in this area and taking into account the application fields of AAL which were mentioned before in section 2.2 and used in the existing survey (see chapter 5), the following points are seen as important in the area of quality of life and will, therefore, be used for further inspections in the new survey (see chapter 5).

- **Mobility**
  Mobility will be considered because of the high importance for older people. Here the mobility in their own homes or the transport possibilities are meant.

- **Independence**
  Independence goes hand in hand with mobility, but consists not only of it. Independence means doing things without the need of help is very important for older people.

- **Social communication**
  Social communication is considered to be part of the social wellbeing of older people. It helps to maintain social relationships and activities with other people.

- **Safety**
  Under safety one can see the security of a home and neighbourhood. The importance for older people to feel secure in their environment is high and, therefore, high safety is important. In figure 2.3 we see that security is directly connected with neighbourhood, stability and finance. Because of this these three points will not be mentioned extra.

- **Health**
  Is part of the physical wellbeing and it is important so that one is not restricted and can do what one wants.

- **Comfort**
  Under the point comfort fall privacy, home and neighbourhood.

In this thesis the psychological and emotional wellbeing will not be listed for the quality of life because it is irrelevant for the questions in the new AAL survey. This is because the companies are not in a position to estimate the influence their project/product/service will have on the emotional or psychological level of people.
The financial circumstances of older people will not be part of the quality of life because AAL has no direct leverage on financial situation of an individual.

In order to improve the quality of life and to support older people in Austria there is a sophisticated care system. This care system will be discussed in the following chapter in more detail.

CHAPTER 3

# Care system in Austria

## 3.1 General information of the care system in Austria

Since 1993 cash and non-cash benefits are disbursed to people in need of care. Cash benefits arrive in the form of a monthly nursing allowance whereas non-cash benefits are services for people not capable of independent daily living. The Federal Long Term Care Allowance Act entitles all Austrian citizens fulfilling certain defined criteria to a nursing allowance which is financed by taxes. However, the use of said allowance lies within the discretion of every individual. On the other hand non-cash benefits are a privilege and not law, therefore, they are regulated differently from province to province [SCH2006].

According to Schneider et al. there are two different kinds of care, a formal and an informal one.

### 3.1.1 Formal care

Formal care refers to nurses or professional caretakers responsible for taking care of people not capable of independent daily living. This can either be in terms of traditional residential care homes for older people or mobile services whereby older people are able to stay in their own home.
In Austria there are the following forms of services available:

#### Mobile services

The main areas of mobile services are

- home helpers,
- nursing auxiliary,
- medical orderlies,

as well as

- ”Meals on Wheels”,
- visiting services and
- driving services.

Mobile services aim to enable people in need of care to stay at their own homes and don't have to use stationary services and at the same time relieve family and friends. Moreover, mobile services enable people to maintain socials contacts by being able to attend local senior meetings or other events as well as regular visits by non-family members, therefore, they counteract isolation [SCH2004].

**Home Help**
A home helper is someone mostly without medical education who supports a person in need of care by visiting on a regular basis. During their visit they help to clean and take care of other household chores like heating.
Furthermore, it lies within their responsibility to observe the overall health and fitness of their employer and contact either the family of the family doctor in case of changes in condition.
Moreover, they assist with shopping and cooking, intake of food and supervise the diet as well as non medical body care.
In addition they conduct some basic nursing activities like helping the person in need of care with getting in and out of bed and providing and reminding them of the intake of their medication.

**Nursing Auxiliary**
They support people not capable of fully independent living with activities of their daily life. This aims not only to help better their physical but also their psychological and social well-being. Their duties encompass support and relief of relatives, assistance in maintaining social contacts to prevent isolation and loneliness as well as carrying out basic nursing like help with getting in and out of bed, personal hygiene, prophylaxis, diet and the preparation and intake of medication. In addition the help with household chores, however, this is limited to cleanliness.

**Medical Orderlies**
These are professionals in the field of healthcare, that make house calls during which they fulfill duties, pre-decided by the family doctor, only a trained medic is allowed to perform.
These duties include the medical treatment as instructed by the family doctor as well as the assessment of the reliance on care and its scheduling. They also advise patients and their families in regard to nursing problems, facilities, diet and the alterations of the circumstances of life.
Also part of the duties is to support the people in need of care in keeping the house clean, the shopping and other activities of daily life. The medical orderly comes into the house, is taking care of the household and takes care of the physical well being.
Another responsibility of medical orderly is the counselling in the aspect of helping to keep people fit and active [KTN2013b].

About 140.000 people in Austria make use of the offered mobile services, which are approximately three times as many as the users of stationary services, which amount to approximately 47.000 people. As shown in table 3.9, mobile services are the most used offers in Austria. Gross expenditure for these offers total to EUR 486 mio. in 2011.

Speaking about numbers in the provinces of Austria, Upper Austria has the highest number of users in the area of mobile services with about 31.000 mobile services which is 2,2% of the people living in Upper Austria, closely followed by Vienna and Lower Austria each with 27.000 (1,57%) and 25.000 (1,55%) taking advantage of mobile service offers for older people. Hindmost is Burgenland with only 4.600 ( 1,61%) users. These datas differ greatly due to the difference in number of population in each province [STA2013c].

During the last few years the number of people using mobile services has risen steadily on the one hand due to the improvement of offered services, on the other hand a change of mindset happened regarding acceptance of mobile services.

In the fledgling stages an extensive negative attitude held its sway over these services, since they were pricy and furthermore offers were few and wide apart with even less employees, especially in rural areas [BER2005].

Over the last decade the numbers of full-time employees has increased significantly reaching about 7.800 [SCH2004] in 2002, whereas already 12.000 [STA2011b] people were employed full time in 2011 in the area of mobile services. This is an enhancement of 35% in the last decade.

Costs for mobile services in Austria differ from province to province and are dependent on the service itself (Home help, nursing auxiliary, medical orderly) as well. Furthermore, the income of the person in need of care is taken into account. Every Austrian province has their own tariff list, showing hourly costs for mobile services, which serves as assessment basis for the calculation.

**Example Carinthia:**
In the following tables (Table 3.1 - 3.4) examples for the costs of mobile services in the province of Carinthia are shown with and without nursing allowance assuming a pension of EUR 900 and EUR 2.500. These are the prices which have to be payed by the patient.

**Stationary services**

Facilities for permanent or temporary accommodation, care and nursing of mainly older people or disabled ones including residential care homes and residential homes for the older people are part of stationary services. Older or disabled people not fit to live by themselves whose friends and family can't provide full-time care can stay in these facilities.

| **Fee to be paid for one hour of mobile services in Carinthia without attendance allowance (in EUR) Pension EUR 900** | |
|---|---|
| **Nursing type** | Fee (per hour) |
| Medical Orderlies | 9,60 |
| Nursing Auxiliary | 8,60 |
| Home help | 22,73 |

Table 3.1: Example fee to be paid for one hour of mobile services, without attendance allowance (based on Tariff List)

| **Fee to be paid for one hour of mobile services in Carinthia with attendance allowance level of care 1 (in EUR) Pension EUR 900** | | |
|---|---|---|
| **Nursing type** | | Fee (per hour) |
| Medical Orderlies | 9,60 + 8,00 | 17,60 |
| Nursing Auxiliary | 8,60 + 7,00 | 15,60 |
| Home help | | 11,60 |

Table 3.2: Example of fee to be paid for one hour of mobile services, with attendance allowance, level of care 1 (based on Tariff List)

| **Fee to be paid for one hour of mobile services in Carinthia without attendance allowance (in EUR) Pension EUR 2.500** | |
|---|---|
| **Nursing type** | Fee (per hour) |
| Medical Orderlies | 25,60 |
| Nursing Auxiliary | 24,60 |
| Home help | 34,13 |

Table 3.3: Example of fee to be paid for one hour of mobile services, without attendance allowance (based on Tariff List)

As mentioned before, about 74.000 people in Austria stay in residential (care) homes. Gross expenditure for stationary services amounts to 2.2 billion EUR which is much higher than for mobile services or any other form of care service. See table 3.8 [STA2011b].

Costs for the stay at a residential (care) home depend on the level of attribution needed. They vary from EUR 1.000 if only a modicum amount of time is spent on nursing duties up to EUR 4.000 for people in need of special care. The costs are covered through the care allowance, the income of the resident, which in most cases is the pension, as well as other assets. One of this

| **Fee to be paid for one hour of mobile services in Carinthia with attendance allowance level of care 1 (in EUR) Pension EUR 2.500** | | |
|---|---|---|
| **Nursing type** | | Fee (per hour) |
| Medical Orderlies | 25,60 + 8,00 | 33,60 |
| Nursing Auxiliary | 24,60 + 7,00 | 31,60 |
| Home help | | 23,00 |

Table 3.4: Example of fee to be paid for one hour of mobile services, with attendance allowance, level of care 1 (based on Tariff List)

other assets is the so called ”Pflegeregress”. Regress means that family members have to repay part of the costs for the nursing home place. Currently, July 2013, the ”Pflegeregress” exists only in Styria. If necessary, the social welfare grant covers costs that can't be covered by the patient [SCH2006].

The costs for stationary services vary and are dependent of the level of care, province and residential home. In table 5.1. it can be seen that monthly costs for residential (care) homes are the highest in Vienna where costs are between EUR 2.500 and EUR 6.300.
The reason for this are on the one hand high rents and on the other hand the price for plots of land are very expensive in comparison to other provinces. Average costs for stationary services range from EUR 1.900 minimum and EUR 4.222 maximum.

| **Federal State** | Minimum Cost (EUR) | Maximum Cost (EUR) |
|---|---|---|
| Vienna | 2.500 | 6.300 |
| Carinthia | 1.800 | 4.100 |
| Burgenland | 2.300 | 3.300 |
| Tirol | 1.400 | 3.300 |
| Upper Austria | 2.000 | 3.300 |
| Lower Austria | 1.800 | 7.500 |
| Styria | 2.000 | 3.200 |
| Vorarlberg | 2.200 | 4.000 |
| **Average** | **1.900** | **4.222** |

Table 3.5: Average monthly costs of stationary services in the federal states (own calculations based on [BMA2013])

### Day-care services

Day-care services are facilities that ensure the accommodation and nursing care of older or disabled people during a part of the day. The aim of day-care services is to ensure that the highest degrees of psychological, physical, mental and social capabilities are maintained [http://www.soziales-leben-oesterreich.at].

These service is used by about 5.000 people. In 2011 gross expenditure for day-care services amounted to EUR 22 million [STA2011b].

### Short-term care

This is sometimes required temporarily after a hospital stay to relieve informal caregivers, so they may recharge their batteries. In 2011 about 5.500 people used the short-term care. Gross expenditures amounted to EUR 10.5 million.

### Alternative forms of living

This is a more personal form of care-taking for people in care levels 1 to 3. Should a higher level of care be necessary these people need to move to more classic residential care homes for their own safety, as regulated by government.

Mostly these are small specially prepared residential homes with round the clock care available. Care is more personal and usually of higher quality than in stationary services due to the rather low number of people accepted into one facility. To cover the costs of alternative liv-

| **Fee to cover costs for inhabitant of the alternative forms of living (in EUR)** | |
|---|---|
| Pension | 202,76 |
| Compensatory allowance | 328,33 |
| Attendance allowance | 442,90 |
| | **973,99** |
| Deduction PVA | - 71,39 |
| Personal contribution | **902,60** |
| Pocket money for inhabitant | - 145,10 |
| **80 % personal contribution to province** | **757,50** |

Table 3.6: Personal contribution of the fee to cover costs of the alternative forms of living in Carinthia

ing arrangements usually pension, attendance allowance and a compensatory allowance are used.

Example as seen in table 3.6.

The attendance allowance for an older person in level of care three is EUR 442,90 with a pension of EUR 202,76 and a compensatory allowance of EUR 328,33 which amounts to a personal contribution of EUR 973,99. From this a retirement pension insurance of EUR 71,39 is deducted. Only 80 % of the personal contribution are used to cover the costs for the alternative home. The remaining EUR 154,10 are available to the inhabitant in the form of pocket money. Personal

| **Costs of an alternative form of living for the province Carinthia 2010 (in EUR)** | |
|---|---|
| Daily rate | 55,39 |
| 365 days | 20.217,35 |
| Year 2010 | 20.217,35 |
| Deduction personal contribution (757,50 x 12) | - 9.090,00 |
| **Costs for Carinthia** | **11.127,35** |

Table 3.7: Costs of an alternative form of living for the province Carinthia in 2010

contribution of the inhabitant amounts to 757,50 per month. As seen in table 3.7 the daily rate of an alternative living arrangement in Carinthia is EUR 55,59 daily which amounts to EUR 20.217,35 in one year compared to EUR 9.090 personal contribution. This leaves costs of EUR 11.127,35 to be covered by Carinthia for one person in an alternative living arrangement.

In Austria costs for alternative living forms in 2011 were about EUR 158.333.624 for 11.021 people living in alternative homes. This shows that average costs per person amount to EUR 14.366,83 annually [STA2011b].

### Case- and Caremanagement

A qualified professional takes a look at each individual case to create a custom made best-practice care package through a combination of day-care services, short-term care and mobile services [EWE2005] [HAN2006].

The case management society of America defines case management as ”a collaborative process of assessment, planning, facilitation and advocacy for options and services to meet an individual’s health needs through communication and available resources to promote quality cost-effective outcomes.”

About 66.000 people in Austria took advantage of this service in 2011. The gross expenditures were about EUR 10 million as seen in table 3.8.

| Federal state | Mobile services | Stationary services | Day-care services | Short-term care | Alternative forms of living | Case- and caremanagement |
|---|---|---|---|---|---|---|
| **People in care** | | | | | | |
| **Total** | **140.157** | **74.789** | **5.053** | **5.513** | **11.021** | **65.938** |
| Burgenland | 4.611 | 2.018 | 149 | - | - | - |
| Carinthia | 10.521 | 5.018 | 64 | 402 | 79 | 1.483 |
| Lower Austria | 25.326 | 11.924 | 433 | 2.416 | - | 15.571 |
| Upper Austria | 31.150 | 15.681 | 852 | 9 | 8 | 9.500 |
| Salzburg | 5.779 | 3.861 | 544 | 420 | - | 3.027 |
| Styria | 15.044 | 15.473 | 253 | - | 654 | - |
| Tirol | 8.295 | 5.400 | 337 | 782 | - | 5.279 |
| Voralberg | 12.531 | 2.054 | 421 | 505 | 120 | 298 |
| Vienna | 26.900 | 13.360 | 2.000 | 979 | 10.160 | 30.780 |
| **Federal state** | **Mobile services** | **Stationary services** | **Day-care services** | **Short-term care** | **Alternative forms of living** | **Case- and caremanagement** |
| **Care attendants (full-time employees)** | | | | | | |
| **Total** | **11.945,7** | **30.572,6** | **395,6** | **(249,3)** | **(475,3)** | **(702,6)** |
| Burgenland | 242,2 | 818,7 | 16,8 | - | - | - |
| Carinthia | 1.045,0 | 1.596,8 | 4,4 | - | 14,1 | 4,0 |
| Lower Austria | 2.705,0 | 4.573,0 | 23,5 | 18,3 | - | 489,0 |
| Upper Austria | 1.305,6 | 5.351,8 | 43,9 | 1,0 | 2,1 | 38,7 |
| Salzburg | 591,9 | 1.868,9 | 32,8 | - | - | 14,2 |
| Styria | 943,0 | 4.257,4 | 19,1 | - | 45,1 | - |
| Tirol | 557,1 | 2.591,3 | 29,1 | - | - | - |
| Voralberg | 166,9 | 1.176,7 | - | - | - | 7,7 |
| Vienna | 4.389,0 | 8.238,0 | 225,0 | 230,0 | 414,0 | 149,0 |
| **Federal state** | **Mobile services** | **Stationary services** | **Day-care services** | **Short-term care** | **Alternative forms of living** | **Case- and caremanagement** |
| **Tax inclusive expenditure (in EUR)** | | | | | | |
| **Total** | **486.432.512** | **2.181.633.523** | **21.551.486** | **10.450.101** | **158.333.624** | **9.933.394** |
| Burgenland | 6.726.803 | 50.603.642 | 349.220 | - | - | - |
| Carinthia | 24.162.430 | 138.804.449 | 432.522 | 550.000 | - | 185.103 |
| Lower Austria | 68.357.875 | 316.759.111 | 898.070 | 4.118.416 | - | 1.974.403 |
| Upper Austria | 65.084.478 | 325.343.062 | 1.634.596 | 11.091 | 173.860 | 2.134.729 |
| Salzburg | 17.995.390 | 90.544.771 | 629.380 | 233.216 | - | 864.467 |
| Styria | 49.000.000 | 366.652.174 | 1.199.500 | - | 1.198.402 | - |
| Tirol | 26.914.206 | 130.998.917 | 831.622 | 420.266 | - | 235.227 |
| Voralberg | 21.073.000 | 77.666.706 | 242.127 | 1.131.404 | 1.167.863 | 100.625 |
| Vienna | 207.118.330 | 684.260.691 | 15.334.449 | 3.985.708 | 155.793.499 | 4.438.750 |
| **Federal state** | **Mobile services** | **Stationary services** | **Day-care services** | **Short-term care** | **Alternative forms of living** | **Case- and caremanagement** |
| **Net expenditure (in EUR)** | | | | | | |
| **Total** | **314.764.696** | **1.140.154.640** | **18.432.337** | **6.178.384** | **(68.121.690)** | **9.585.716** |
| Burgenland | 5.308.522 | 20.804.218 | 349.220 | - | - | - |
| Carinthia | 19.332.430 | 63.485.204 | 432.522 | 550.000 | - | 185.103 |
| Lower Austria | 40.525.597 | 147.887.178 | 898.070 | 2.118.416 | - | 185.103 |
| Upper Austria | 44.539.758 | 140.166.535 | 1.391.854 | 6.936 | 52.792 | 2.132.094 |
| Salzburg | 14.538.846 | 42.615.035 | 629.380 | 233.216 | - | 864.467 |
| Styria | 30.200.000 | 201.997.846 | 645.000 | - | 753.580 | - |
| Tirol | 18.588.322 | 66.552.539 | 390.067 | 320.283 | - | 235.227 |
| Voralberg | 9.884.903 | 43.386.143 | 242.127 | 765.840 | 514.692 | 100.652 |
| Vienna | 131.846.319 | 413.259.942 | 13.454.096 | 2.183.666 | 66.800.626 | 4.093.797 |

Table 3.8: Overview care costs in Austria [STA2011b].

### 3.1.2 Informal care

Often family members or friends overextend themselves with taking care of older or disabled people close to them. This responsibility is stressful, time consuming and often higher ranking

than their job which can lead to a reduced income. These cutbacks should be considered as care costs.

In 2008 a study about informal care was conducted by the Vienna University of Economic Sciences [VIC2008] in which 2.768 people caring for an older or disabled people were interviewed and their effort measured by the following variables.

**Expenditure of time**
Measured in days and hours per week dedicated to looking after the person in need of care. In figure 3.1 it can be seen that more than half of the people questioned helped seven days a week thereof an average of 45 hours per week were spent with care responsibilities.

Only a quarter of the interviewees helped less than ten hours a week whereas also a quarter of them spent over fifty hours with care responsibilities. About 10% were scheduled 24/7 with taking care mostly of spouses. This can be seen in figure 3.2. It should also be noted that additional costs incur through travelling from and to the person in need of care.

Because of the time consuming task of caring, people can often only do part time jobs or have to resign work altogether when hours spent on taking care exceed 40 hours per week. Also their free time suffers because very often to survive they have to take low paid part time jobs to afford their daily living.

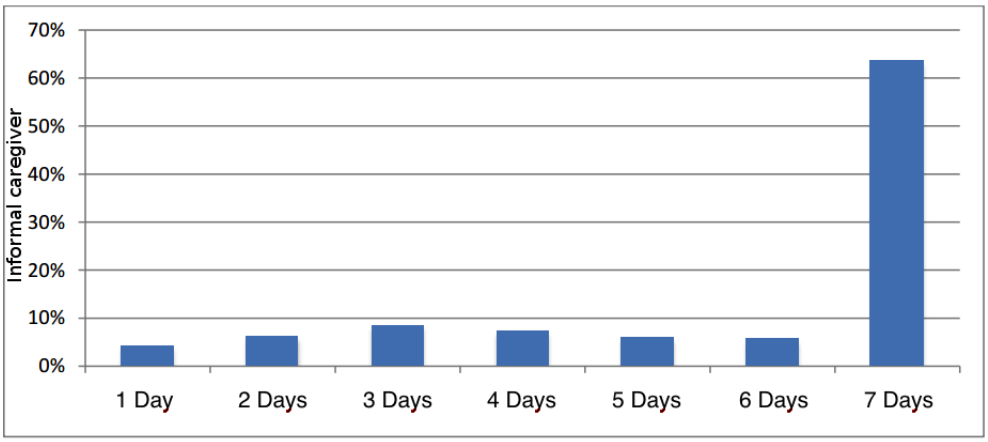


Figure 3.1: Informal care, number of hours in one week [VIC2008]

**Care- and assistance activity**
This can be divided into three daily activities. Firstly there are personal activities which con-

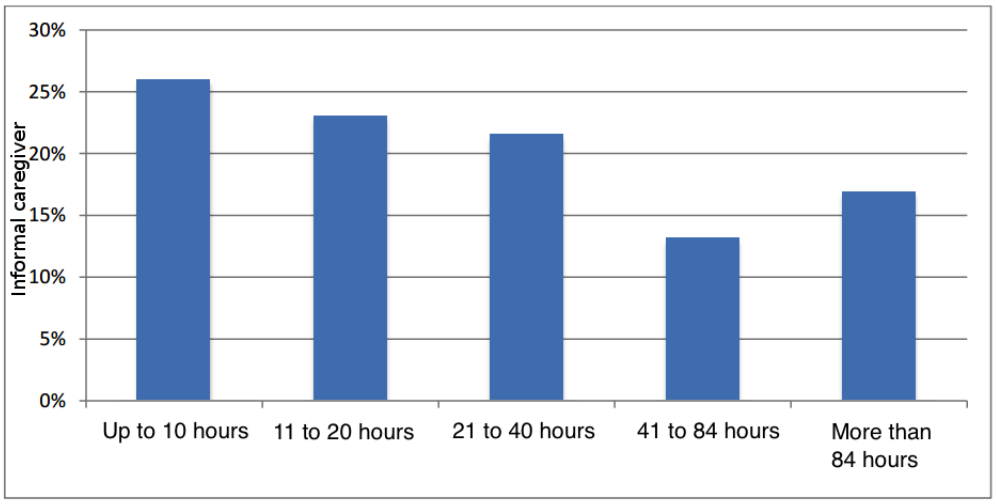


Figure 3.2: Informal care, number of weekly care hours in Vienna [VIC2008].

sist of dressing and undressing, body care, ingestion, help to relieve oneself and help in getting around the flat. Secondly there are instrumental activities like preparation of meals, help with medication, housework, procure the groceries, money matters/banking transactions, getting around outside the flat, look through the mail, organization of assistance and supervision. And last there are social activities which encompass conversing with people in need of care and emotional devotion as well as help in obtaining social contacts.

**Duration**
The time a person spends on caring amounts to an average duration of seven years of their life [WUW2007].

### Costs of informal care

Assuming an average income loss of EUR 1.732 (hourly rate EUR 10,80) net per month [STA2013d] for a full time job that can't be followed because of informal caring duties these people have to depend on financial support of the state.

Informal caregivers are entitled to welfare support if the person in need of care is appointed level of care three or higher [ARB2013].
Minimum collateral consists of two components. Firstly the basic amount of EUR 596,18 and secondly EUR 198,73 housing expenses per month. This amounts to EUR 794,91 which still is

a loss of around EUR 1.000 per month. Even with a part time job there is still a financial loss about the same sum.

## 3.2 Level of Care - Care Allowance

Austria is a welfare state and offers a variety of social benefits as mentioned before. There are seven levels of care [BUN2013] in Austria which were previously shortly noted. These levels differ from each other by the amount of care needed and the money received from the state. An overview about the different levels of care and their nursing allowance can be seen in table 3.9.

### Level of care 1

Only 60 hours of help per month are needed in this stage. This corresponds to two hours of help per day. The tasks that can be performed in such a short time, according to experts, are limited to basic needs . Implied is full body hygiene, prophylaxis, preparing and administration of medication and help to get in and out of bed. Depending on the degree of disability, individual therapy is offered such as exercise, brain training and occupational therapy.
The nursing allowance amounts to EUR 154,20 per month.

### Level of care 2

More than 85 hours of care per month are needed for the second level of care which corresponds to three hours of care per day. It does barley differ in activity and effort from level of care one.
The nursing allowance amount to EUR 284,30 per month.

### Level of care 3

In the third stage a person needs more than 120 hours of help per month. This would be four hours of help per day. Here a care attendance can take care of the basic needs and individual therapy.
The height of the nursing allowance in this stage is EUR 442,90.

### Level of care 4

Here more than 160 hours of help are needed per month. These correspondents to more than five hours of professional help per day. According to experts, it is possible for a care attendant to help with basic needs and in collaboration with the general practitioner to handle the medical treatment which includes the administration of medicine, renewal of bandages and the application of injections. Also therapeutic activities such as breathing exercises, motion exercises and memory training. Another task of the care attendant is to help with domestic chores like cooking a meal, shopping food, cleaning, doing laundry and other chores around the house.
The nursing allowance amounts to EUR 664,30 per month.

### Level of care 5

In the fifth stage a person needs more than 180 hours of help per month and an extraordinary nursing care effort is required. It has to be taken care of the same tasks as in the previous levels. However, a higher nursing effort must be expected. Most people who are in this level aren't able to live by themselves and have to stay in residential care homes.
The nursing allowance amounts to EUR 902,30 per month.

### Level of care 6

A person in need of care will be classified for this level of care if the timing for the care measures is not foreseeable and these are to be performed regularly throughout the day and night or the constant presence of a caregiver during the day and the night is necessary because the likelihood of harm or self-harm is given. In this level it is not possible to care for this person at their home. The nursing effort would be too high.
The nursing allowance amounts to EUR 1.260 per month.

### Level of care 7

This is the last stage where a person in need of care is not able of goal-directed movements of his limbs with functional reactions or suffers a condition with similar dimensions. People in this stage can't do even simple things independently.
The nursing allowance amounts to EUR 1.655,80 per month.

| Need for care in hours per month | Level of care | Costs/month (in EUR) |
|---|---|---|
| More then 60 hours | 1 | 154,20 |
| More then 85 hours | 2 | 284,30 |
| More then 120 hours | 3 | 442,90 |
| More then 160 hours | 4 | 664,30 |
| More then 180 hours, if<br>- exceptional nursing care is required | 5 | 902,30 |
| More then 180 hours, if<br>- timing for the care measures is not foreseeable and these are to be performed regularly throughout the day and night or<br>- the constant presence of a caregiver during the day and the night is necessary because the likelihood of harm or self-harm is given | 6 | 1.260,00 |
| More then 180 hours, if<br>- no goal-directed movements of the four limbs with functional reaction are possible or a condition with similar dimensions - | 7 | 1.655,80 |

Table 3.9: Nursing allowance in the different level of care [BUM2013].

### Financing of care services

Care services are financed by own means and through support by the state in form of social welfare payments. Social welfare depends on the the available income and the total realizable assets of the person in need of care. 80% of the pensions and maximal 80% of the nursing allowance is used to pay for stationary services. Any other kind of income is fully used to pay for the care. Should there be any other assets then they will be used to cover stationary home costs. The costs which cannot be covered will be taken over by the social welfare system [MÜH2006].

An overview of the cash flows in the care system can be seen in Figure 3.3. The person requiring care, receives subsidies from the federal government and the state, which could be used to pay for the formal care. The person in need of care must also contribute a part of their pension to pay for the formal care. Also other income like donations or subventions are used to pay for the care [SCH2006].

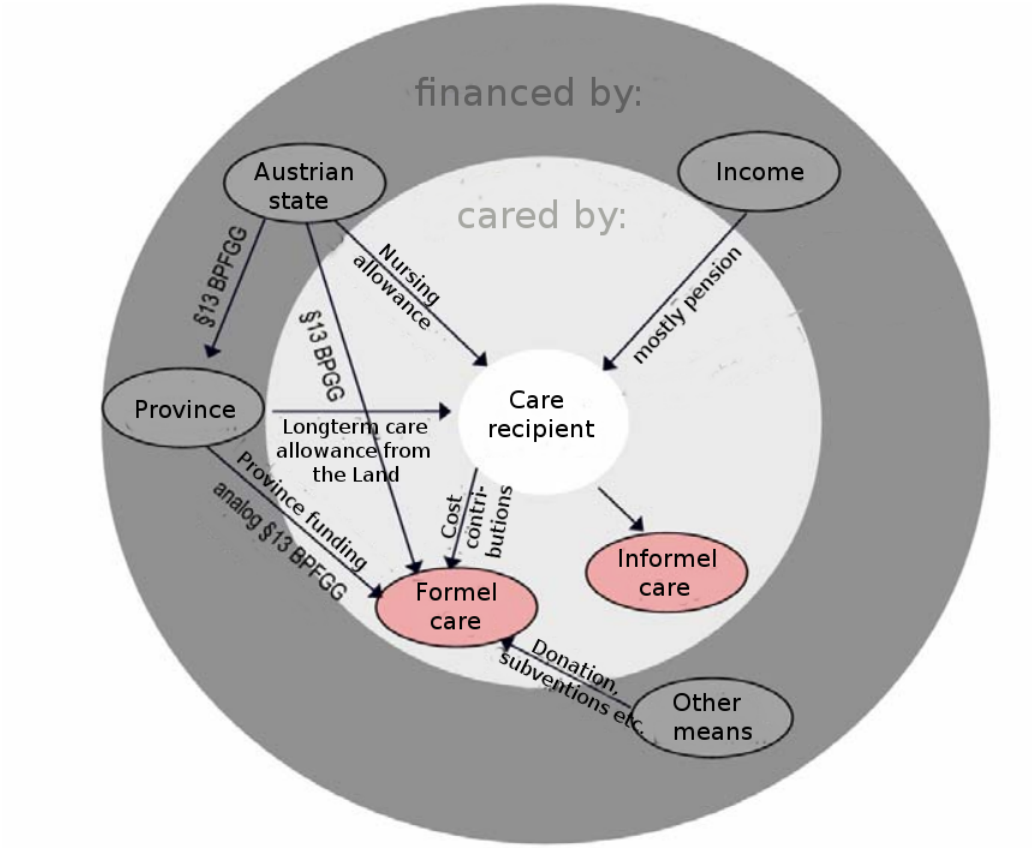


Figure 3.3: Care cost payment flow statements [SCH2006].

## 3.3 Short Overview of the Average Care Cost

The Austrian state provides people in need of care with an nursing allowance. This attendance allowance is based on the level of care a person is categorised in.

Each stage has a different amount of nursing allowance [BUM2013]. The amount of the allowance can be seen from table 3.10. In 2011 the number of people in need of care was 302.462 in Austria, distributed on mobile services, stationary services, day-care services, short-term care, alternative forms of living and case- and care management [STA2011].

- 140.157 people are in need of mobile services
- 74.789 people are in need of stationary services

| Care form | Expenses (EUR) |
|---|---|
| Mobile services | 486.432.512 |
| Stationary services | 2.181.633.523 |
| Day-care services | 21.551.486 |
| Short-term care | 10.450.101 |
| Alternative forms of living | 158.333.624 |
| Case- and caremanagement | 9.933.304 |
| **Total** | **2.868.334.550** |

Table 3.10: Care costs in the different care forms [STA2011b].

- 5.053 people are in need of day-care services
- 5.513 people are in need of short-term care
- 11.021 people are in need of alternative forms of living
- 65.938 people are in need of case- and caremanagement

The cost for the different forms of care in 2011 are shown in the following table (Table 3.10). As can be seen in the table the stationary services have the highest costs with about EUR 2 billion.

## Examples

### Example A

A 76 year old man, living alone, needs help taking care of himself. He is classified in the level of care two which implies that his need of care is more than 85 hours per month and he is entitled to a monthly nursing allowance of EUR 284,30. Additionally he has his pension of EUR 900,00 per month. He needs someone to help him get ready for the day and with his medication as well as basic human needs. For these tasks a home help visits every day which costs EUR 11,60 per hour. This would be EUR 986 per month.

### Example B

An 80 year old woman, living alone in her house is classified in the level of care five, which indicates that she needs more than 180 hours of help per month. She is entitled to a nursing allowance of EUR 902,30 and additionally she receives a pension of EUR 900,00. She has problems getting around the house and she recently tends to collapse. Her family worries about the high risk of her falling and being seriously injured while nobody is around to help, so they consider to relocate her to a residential care home. This would cost EUR 3.300 per month. To pay for this her pension and 80% of her nursing allowance (EUR 1.621,84 altogether) are used whereas the difference (EUR 1.678,16) are paid by social welfare, because there are no other assets. Hence costs for the Austrian state increase significantly.

CHAPTER 4

# AAL-Survey - Austrian AAL Atlas

## 4.1 General

According to the information gathered in the previous chapters an existing online survey is revised and updated. The purpose of this survey is to get information from firms with AAL projects or products to generate a database with their project information and to get information about their expenses in regard to their projects for further analyses.

To extend the online survey LimeSurvey [LIM2012] is used.

### LimeSurvey

LimeSurvey is a free and open source online survey application written in PHP, which can be used online on their website or be downloaded and used as an offline application. LimeSurvey consists of a lot of different question types which can be used. The following question types are interesting for this survey.

- Question type - Yes-No
  Here it is possible to choose between the two answers yes or no.
- Question type - 5 point choice
  A list of five radio buttons are given and one can choose one of them. It starts with one and goes up to five. This question type can be used like the school grade system.
- Question type - Short free text
  This question type is used, if the questionee has to answer in his/her own short words.
- Question type - Multiple choice
  A list of possible answers is given and the questionee can choose one or more of them.

- Question type - List (Radio)
  A list of possible answers is given and the questionee can choose one out of them.

- Question type - Multiple short text
  Here a list of possible answers is given and the questionee can choose one or more of them and to every choice it is possible to give a short explanation..

- Question type - Long free text
  This question type consists of a larger field and the questionee can write a long answer into it.

It is possible to create survey questions which affect the questions to follow. It depends on the answer which questions follow up, this can be generated with the help of conditions. To each question a condition can be used to specify the rest of the questions. This is used in the way that not each questionee has to answer all questions of the survey and that the questions differ slightly depending on the type (project/product/service) chosen. For Example the survey starts with the question if information to a new project/product/service should be submitted. If the answer is yes he/she gets all the questions considering the project/product/service. If the answer is/she no he only gets the questions regarding the economic benefit of their AAL project/product/service. The questions of the survey will be discussed in the next two sections.

A problem of LimeSurvey is that it is not possible to generate loops for the questions, so that one can say that some questions have the possibility to be answered more then ones. For example when a questionee has more than one AAL project/product/service then it is necessary to have all the questions regarding the project/product/service part of the survey twice. Instead that one can say ”if the user has more than one project than go back to question 1”. Because of this the number of questions in the survey will get really high.

## 4.2 Existing Survey

The existing survey [TUW2011] which is used, was created by the Vienna University of Technology and the ”Industriellen Vereinigung Wien” in 2011. The main purpose of this survey was to gather information about the current AAL projects in Austria. This survey was sent out to over 350 firms. It was assumed that these firms could have some projects/products/services in the area of Ambient Assisted Living. Out of these firms 158 had a look at the survey and 97 completed the survey. 61 firms answered some questions, but not the whole survey. Around 128 projects/products/services were listed.

### 4.2.1 Questions

The first part of the survey consists of the general information about the firm, which are considered the base data set. This information is relevant, because it is important to know the facts

of the company to have a contact point for enquiries relating their responses. The information about the company and contact person is also needed to generate a profile on the web application (see chapter 6) with which one can login and maintain their information on the website.

**Listing 4.1: The Questions regarding the information on the organization and contact person are as follow**

```
- Name of the Firm or Organization
- Department
- Which kind of company / institution is it?
    Work company
    Service
    Research facility
    Other
- What kind of economic enterprise?
    small
    medium
    large
- In which area do you work as a service provider?
    In the social sector
    In the area of health
    Others
- Your research facility
    At a university
    At a technical college
    non-university
- Contact person
    Title
    Surname
    First name
    Email
- Address
    Street and house number
    Zip
    City
- Additional information
    Phone number
    Fax number
    Web Page
```

---

The next questions are needed to allocate the field of work to the various fields of Ambient Assisted Living. With the help of these questions the distribution of the different areas can be shown. This shows us in which fields are the most projects/products/services represented. It is also enquired if there is an interest to be part of a single point of contact.

**Listing 4.2: Allocation of the field of work to the various fields of AAL**

```
- Main sector
    Health
    Prevention / Wellness
    Comfort
```

```
    Security
    Social communication
    Information / Education
    Mobility
    Work environment
    Leisure time
    Energy efficiency
    Interdisciplinary topic
    Others
- Sub sector
    Health
    Prevention / Wellness
    Comfort
    Safety
    Social communication
    Information / Education
    Mobility
    Work environment
    Leisure time
    Energy efficiency
    Interdisciplinary topic
    Others
- How do you think you could benefit from a central point of contact for
    AAL in Austria?
```

**Listing 4.3: Enquiring the interest in a central contact point**

```
- It is planned to create an Austrian AAL platform in near future. Are you
    interested to be part of it and / or participate?
```

The second part of the survey consists of specific questions regarding the AAL project/product/service. It is possible to add multiple projects to a base data set. The base data must be completed only once. These questions are also used to put the information about the different projects/products/services into the web application if desired by the respondent. The information asked here is general information about the project/product/service like the name, a description, the target group, the purpose and benefit and the status of the project/product/service.

**Listing 4.4: Specific questions about the project/product/service**

```
- What is it?
    Project
    Product
    Application or distribution of a third-party product
    Service
    Other AAL-activity
- Name of project/product/service
- Short description of the project/product/service
- Target group of the project/product/service
    Private end user
```

```
    Private institution
    Public institution
- Mapping of the project/product/service  to AAL-area
    Health
    Prevention / wellness
    Comfort
    Safety
    Social communication
    Information / Learning
    Mobility
    Working environment
    Leisure time
    Energy efficiency
    Interface theme
- Aim and benefits of the project/product/service for user
- Description of the project/product/service
- Homepage of the project/product/service
- Status of the project/product/service
    Idea
    Submitted for promoting
    Started
    Already on-going
    Completed
    Production
- If it is a cooperative project, what is your role?
     Consortium leader
     Project partner
- How should we treat your information?
    Confidential, only for anonymous evaluation by TU Vienna and IV
    Put on the inernet portal for networking purpose
```

---

### 4.2.2 Results

As a result, information about 80 companies and 128 projects, products, and services were collected. In figure 4.1 we see the distribution of the main sector of projects, products and services in the different AAL areas. It can be seen that the main focus of the AAL projects/products/services are on the areas health, safety, mobility, information/education, interface theme and social communication. Therefore, these sections are seen as the important ones and the other areas will be summed up as 'others'. In chapter 2 the priorities of older people were shown. These priorities lie in the areas of health, mobility, safety and social communication. Thus, one can assume that firms concentrate on these areas because of their high priority for older people. Most of the companies don't focus only on one sector, they also have different sub sectors. The distribution of the sub sectors can be seen in figure 4.2. As can be seen, the parts are more evenly distributed than they were in the main sector. The least work is done in the fields of leisure time and energy efficiency.

Considering the questions regarding the creation of a network for AAL firms and projects, the followings facts where gathered:

84 firms stated that they would like to be part of a network for AAL and that the information gathered through the survey can be used for this. A general interest to be part of an AAL platform was stated by 116 participants of the survey, only nine participants have no interest to be part of an AAL platform. As can be seen the desire to have a central point of contact is very high.

The distribution of the different areas can be seen in table 4.1. Companies mostly work on projects, followed by products, other AAL activities and services. Only two firms sell third-party products. As can be seen, 108 projects, products, services and other AAL activities were collected. This collected information about the companies and their projects will be used in the web application (chapter 6). For every company which confirmed that their information can be used for networking purposes on the website portAAL.at, a profile is created and their project information will be added.

**Distribution of areas**

| | |
|---|---|
| Projects | 56 |
| Products | 18 |
| Services | 15 |
| Third-party products | 2 |
| other AAL activities | 17 |

Table 4.1: Distribution of areas

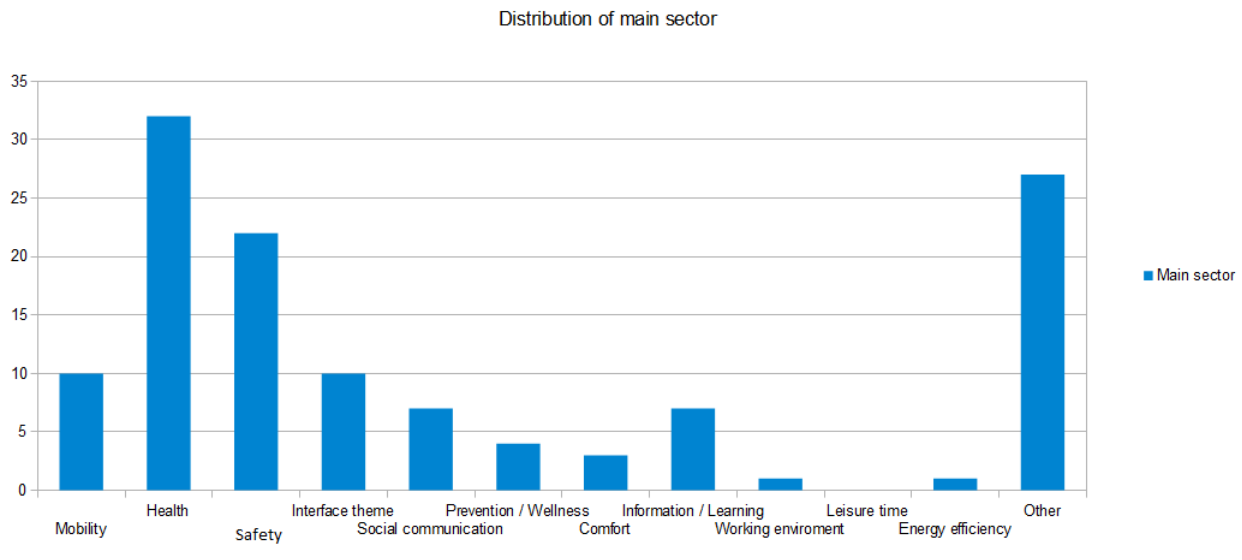


Figure 4.1: Distribution of the fields of use as main sector.

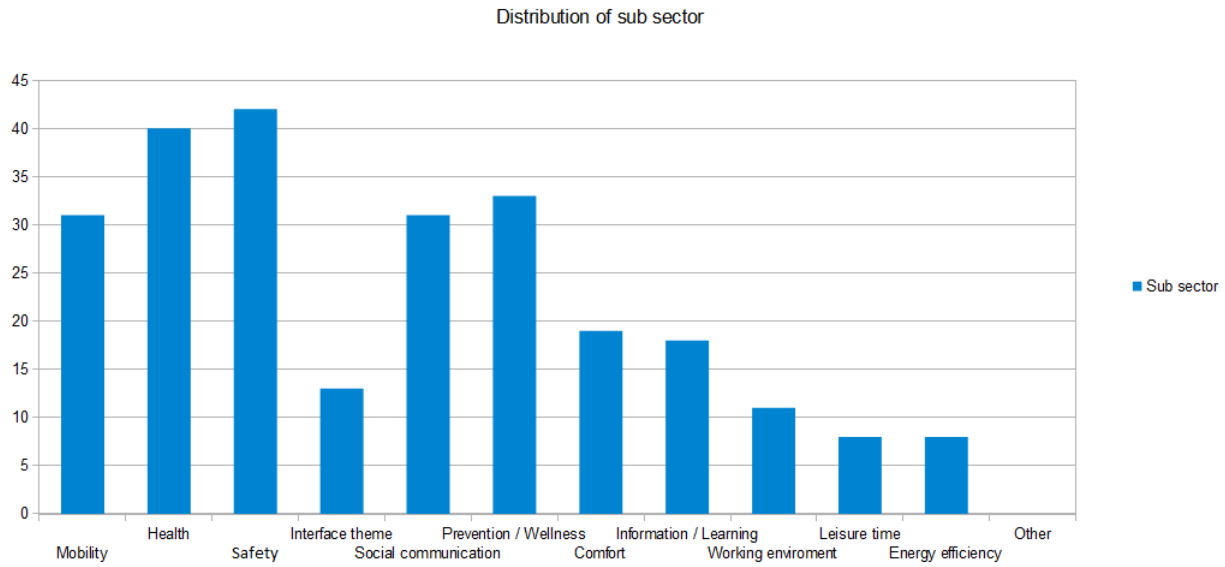


Figure 4.2: Distribution of the fields of use as sub sector.

## 4.3 Expansion of the survey (New Survey)

The new survey consists of the questions of the existing survey and additional questions, which will be described in this section. The main aim of the new survey is to collect additional information about the AAL projects/products/services, which are used to analyse the economic benefits of AAL projects.

### 4.3.1 Questions

A question (listing 4.5) was added to the existing survey which allows the interviewee to make an 'empty report', if they don't have any AAL projects, products or services. It is positioned before the information about the projects, products or services are filled out. So this part could be skipped.

**Listing 4.5: Make an 'empty report' or fill out information about projects/products/services.**

```
- Input of AAL-related projects, products, services or activities
    Enter my AAL activities
    Make a blank report and skip the next point
```

The following questions (listing 4.6) are important for the analytical aspect of this work. The first part of the new questions is about the quality of life. These questions serve as a basis to find out what the companies think about their projects/products/services regarding their added value. The categories of quality of life in the first question are based on the results gathered in chapter

2 where the quality of life was defined. The propose of this question is to gather in which area the project/product/service has the most impact regarding quality of life. Then the extent of the influence on the quality of life should be explained. Does it help with everyday tasks or is it needed in special cases. With these questions the significance of the projects/products/services is garnered concerning quality of life.

**Listing 4.6: In which area helps the project/product/service?**

```
- Quality of life can be divided into different categories, which of these
     categories applies to the project/product/application/service?
    Health
    Safety
    Social communication
    Mobility
    Independence
    Comfort
- How do you see the increase in quality of life, through the use of the
    project? (1...small-5...very high)
- Briefly describe , how the quality of life is improved through the use
    of the project.
- Whereby helps the project/product/application/service?
    Everyday tasks (short text)
    Special Cases (short text)
```

The next two parts are about the level of care (listing 4.7) (see chapter 3) and the investments which are necessary in the development and production of the project/product (listing 4.8). These questions can be skipped if the information is not available or the company doesn't want to reveal them. The information about the level of care is used to find out how much longer people in need of care can stay in a lower level with the help of different AAL projects/products/services. This information gives a time frame with which one can calculate how much money can be saved with the use of the project/product/service in this area. Because the change from one level of care in the next higher one is allied with costs in form of a higher nursing allowance and more nursing hours, it is interesting to know in which level of care the project/product/service could have an influence.

**Listing 4.7: Questions regarding level of care**

```
- In which level of care can this project/product/application/service be
    used?
    Level 0
    Level 1
    Level 2
    Level 3
    Level 4
    Level 5
    Level 6
    Level 7
- In which level of care can a person spend more time with the use of the
    project/product/application/service?
- What is your opinion, how much can the average independent stay at their
     own homes be extended with the use of the project? (how many months)
```

The question considering the development costs (listing 4.9) is important to assess the whole costs of the projects/products/services. With the knowledge about the costs it can be calculated how beneficial the projects/products/services are. The actual sales price of a product or service and the possible renting costs if it can be rented are enquired. With the actual price it can be seen if it is easily possible for older people to buy the product or service or if the price is too high and a longer investment is needed, like a credit. It is also of interest, if it is necessary to install a product in the house and how much effort it is to do this. Another important question is if the product is sustainable and if it can be further used by other people. If this is the case, then the individual costs of a product should be seen under the prospect that the costs don't have to be paid by only one person. Thus, these questions are important to get an overview of all the costs of a project/product/service.

**Listing 4.8: Questions regarding the investment in project/product/service**

```
- Total development investment to enter the market?
    < 50.000
    50.000 - 500.000
    500.000 - 1.000.000
    1.000.000 - 5.000.000
    > 5.000.000
- How much is the production of a piece?
- How much is the project/product/application/service for end users?
    in rent
    on sale
    combination of both
- Is the sustainability of the project/product warranted?
- Can the product be used further by other people?
- Is it necessary for the product to be installed (permanently) in the
    house/apartment?
  - Can the product without great cost or effort used in a new environment
      ?
  - How much would it cost to relocate the product to a new place?
```

The following questions (listing 4.10) are independent to the questions regarding economic efficiency, and can be answered without them. With these questions the interest in a single point of contact is enquired. This is done in the way that it is asked where their information about their products can be found and if they think that this information is easy to find. Also their opinion regarding a single point of contact and how they think it could be beneficial for them is asked. These questions are important to see how large the interest for a central contact point is and to find out who would like to be a part of it.

**Listing 4.9: Questions regarding the single point of contact**

```
- Where can information about your project/product/application/service
    currently be found?
    Own homepage
    Direct contact
    On different sites in the web
```

```
    Others
- Do you think that information about the project/product/application/
    service are easily found?
- In a scale from 1 to 5 how important for you is a single point of
    contact for AAL projects, where your project/product/application/
    service would be represented.
- Have you ever heard of the page portaal.at?
- Do you think that you can benefit from such a single point of contact?
- How can you benefit from such an single point of contact?
```

The last part of the questions is about the testing of the projects/products/services. It is asked where the tests will be carried out or if the companies are looking for ways to test their projects/products. At last it is asked if an AAL quality seal/certificate should be established. If the interest in an AAL quality seal is high then it should be considered.

**Listing 4.10: Questions regarding the possibilities to test the project/product/service**

```
- Where can AAL projects be tested?
- Are you looking for ways to test your projects?
- Where are you currently testing your AAL projects?
- How do you currently test your AAL projects?
- Should there be an AAL quality seal/certificate?
```

### 4.3.2 Dispatch concept

To send out the new survey, which contains the questions of the existing survey and additional questions for the evaluation of the economical benefit for Austria, a concept was generated.

Two different types of receivers are considered. The first receiver group consists of firms which have already participated in the existing survey. The second group consists of firms which didn't participate in the existing survey. Also firms which participated, but didn't want their information published have to be considered.

The firms which already have participated and of which we have information of their projects, will get a survey, where they can decide if they want to answer the questions of the existing survey and the additional questions or if they just want to answer the additional questions. The second option to answer only the additional questions is important, because information about some of their projects are already known from the existing survey. Therefore, they get also their login information to portAAL.at, so that they can update the project data, which was collected with the existing survey. For them it is not necessary to answer the questions regarding the projects, which are already in the database of the web application.

The other firms will get a survey which contains all questions of the existing survey and the additional questions.

For the first emission the survey is sent out to firms which didn't participate in the existing

survey. A mass mail will be sent out to these firms, which consists of the link to the survey and a short cover letter.

The second emission will be sent out four weeks after the first emission. It is sent to all firms which have not participated in the first emission and to the first receiver group which consists of the firms which have already participated in the existing survey.

### 4.3.3 Numbers after first emission

The survey was send out to 626 email addresses from companies which might act in the field of Ambient Assisted Living. About 83 email addresses were invalid and, therefore, were eliminated from the address list. Three people requested to be unsubscribed and 25 people were out of office at this time.

95 people had a look at the survey, out of them 29 have completed the entire survey. 51 people have cancelled the survey after they had a look at the first page. Eight cancelled after they looked at the second page of the survey, which consists of the information about the organisation. Six filled out four pages of the survey and cancelled afterwards. These pages contain information about the organisation, the allocation of their work area to different AAL areas and information regarding the planned networking of AAL. One person omitted the last page of questions, which is made up of questions regarding the creation of a central contact point, testing and certification.

### 4.3.4 Conclusion after second emission

In the second emission the survey was sent out to the firms which didn't participate in the first emission. Therefore, the mailing list was updated, the addresses of people who had participated in the first emission were removed and new addresses were added. In this emission the survey was sent out to about 515 addresses. Eight mail addresses were invalid and 19 automated response mails, with the information that the receiver is out of office, were received.

After the second emission the total number of the responses is 165, from which 58 have completed the survey and 107 did not complete the survey. Thirty-three companies out of the 107 incomplete respondents have filled out their contact information and answered the questions regarding their company, but they did not go further to answering questions about the AAL field they work in. Out of the 58 completed responses 29 made an 'empty report'. That means that they only gave their company information with the questions regarding their AAL fields and the questions regarding the central contact point, testing and their opinion about an AAL-certification. They just didn't give information about projects/products/services. Five companies have given information to more then one project/product/service.

Because the quantity of responses regarding the economic questions of the survey, which were only four, after the second emission, a new survey which consists only of the economical part

of the survey was sent out to a few selected companies. The number of the selected companies was about 30. From these companies six answered the questions regarding their costs. Thus, there is a total number of responses of 64. Out of the 64 companies ten answered the economic questions and 35 answered the questions regarding the quality of life. The distribution of the different areas in quality of life can be seen in figure 4.3. As one can see, most projects increase the quality of life in the areas health and independence followed closely by mobility and safety. Most companies estimate a high increase in the quality of life (see figure 4.4). It was also stated that most projects assist in everyday situations and are not for people with special conditions, figure 4.5.

About 40% of the respondents are looking for possibilities to test their AAL projects/products.

From the answers of the query it could be seen that the interest in an AAL platform is very large. 83% of the companies who have answered the question in this regard, have an interest in such a platform and are interested in contributing (47 positive answers). About 44% of the respondents think that the information of their AAL projects and products are not easy to find. The information can be found on their own website and through direct contact via e-mail or telephone. Some of them have information on different websites, but this does not make it easier to find them. So they see a central point of contact for AAL projects as important. But not only the ones who have problems to be found think so. More than half of all respondents classify such a platform as important to very important, only about 12% think that such a central information point is of no importance.

Also the interest to be a member of AAL Austria is very large. Only nine of the respondents are not interested to be a member of AAL-Austria, that are 14%. 76% of the companies with AAL projects have explicitly stated that the information which has been given in the survey may be incorporated in the internet portal portAAL.at for networking purposes. About 75% of all respondents had already heard something about the website portAAL.at.

The expectations from a central contact point are mainly to get an overview of the different AAL projects to avoid redundancy, an exchange of information, networking of potential partners or collaboration and the exchange of news.

One respondent wishes for greater visibility for his projects through the portal portAAL.at to receive more orders.

Another company says that, '*through networking and commutation, transparency is obtained about any other fields in which companies and research institutions in Austria are researching*'.

Another company expressed a concern and requirement for a central contact point. '*A requirement is that the (informal) "driver" of the platform don't prefer some individual interests (e.g. technology providers, research partners, etc.) and that the contents developed and results are transparent.*'

68,25% think that a AAL-Certification is a good idea and should be introduced. The other 31,75% don't think that a Certification would be advantageous.

Out of all responses, information about 30 projects was gathered. This information will be used to fill the database of the web application. The total number of projects gathered with the existing and new survey about 138. All of them will be added to the database of the web application (portAAL.at).

Due to the information collected through the survey, some economic benefits for the Austrian government are shown in the next chapter.

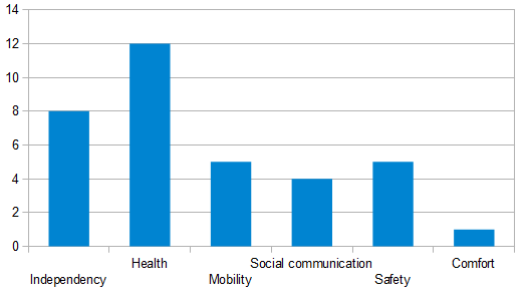


Figure 4.3: Distribution of the quality of life.

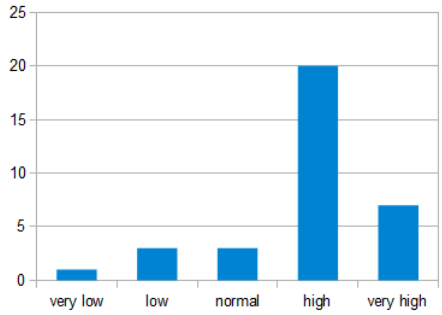


Figure 4.4: Estimated increase in the quality of life

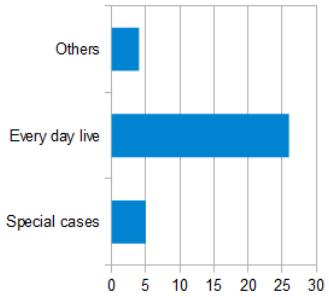


Figure 4.5: Overview of the situation the projects help with

CHAPTER 5

# The economic benefits of AAL projects for Austria

## 5.1 General Information

From the information gathered in the previous chapters about the care costs, the amount of care allowances, the quality of life of older people and the results of the survey, it is determined in this chapter, what economic benefit Austria can achieve if AAL projects are used. It means a big cost jump when one is moved from ones own home to a nursing home, but also the change into the next level of care is accompanied by relatively high costs, because the allowance paid by the state and the need for care increases. For example, more hours of care will be needed in the area of mobile services. Because of this the costs for the older person will also increase.

At first, general scenarios will be created. These scenarios will consider the possibility of a longer independent living in old age and the potential financial impact for people in need of care and the Austrian State. Building on the knowledge gained by the survey it will be shown how much the development of AAL projects will cost and which impact on the daily life of older people they have. Furthermore it will be evaluated how the investment into AAL projects can be worthwhile for the state.
The aim of AAL is, of course, not only to save money. A very important goal of AAL is to enhance the quality of life and to make the everyday life, of people in need of care, as uncomplicated as possible.

### Short description of the costs for Austria

The annual costs of the federal care allowance in Austria is over two billion Euro, which includes all seven levels of care. The number of federal care allowance recipients is growing

steadily. Since 2001 the number of recipients rose by 27% [STA2011c]. With the largest number of recipients in the second level of care (table 5.2). In 2011, the spending on federal care allowance amounted to 2 billion Euro (table 5.2). This is an increase of 45% since 2001 and it is likely to further increase in the future.

As shown in chapter 3, the monthly cost of care will depend on the level of care and the type of support that is needed. Therefore, different scenarios are created to present the costs and cost savings in different situations.

### 5.1.1 Scenario 1

This scenario is used to show how much it costs the state when a person in need of care must be relocated from his/her home into a nursing home and how much the state can save when this step can be moved a month or even a year. Since the change from the independent life at home to life in a nursing home causes most of the costs, this is a strong example to demonstrate the potential savings.

#### Construction of scenario 1

For this scenario the numbers from chapter 3 referring the yearly costs of stationary services and how many people used the stationary service in the year 2011 are used. The estimation of the potential savings is split into four parts.

1. The calculation will be executed with the care level in which the possibility of changing from ones own home to a nursing home is highest. This care level and the corresponding nursing allowance is chosen in step one.

2. Estimation how many people with the care level chosen in step one live in a nursing homes.

3. Calculation how much costs a person with this care level causes if he/she lives in nursing home.

4. Estimation of the possible savings for the state if it could have been possible for these persons to stay at home longer.

Depending on the level of care, the amount of the nursing allowance is between 154,20 (level of care 1) and 1.655,80 (level of care 7). The distribution of care allowance recipients in terms of the level of care can be seen in figure 5.1. The care intensity in the fourth level of care is, with 160 hours per month and the need of professional help, often too high to take care of them at home. A lot of nursing homes don't accept care recipients with a level of care lower than three or even four [BMA2013]. At the level of care three it is often possible live in assisted living homes which is rarely possible with level of care four. For example the assisted living concept "Alternative Lebensräume" in Carinthia where only people with level of care null to three are accommodated [KTN2013a]. Because of this the people in need of care often have to be transferred to nursing homes at level four. Therefore, the care allowance of level four which is 664,30 Euro per month will be used in the following calculation.

It is assumed that nearly nobody in level one or two is in stationary care, because these people don't need permanent care and are often not accepted as stated in description of step one. To estimate the number of people with level of care four which are living in a nursing home, the numbers in figure 5.1 from level three to level seven are taken. The number of people which are in one of the last five levels of care is 172.313 (see table 5.2). Altogether, 74.789 people are living in nursing homes according to Statistics Austria [STA2011b]. It can be seen that not every person with higher level of care is in a nursing home. Furthermore it is assumed that nearly everyone in level six or seven is in stationary care. Thus, the number of people in level six and seven are subtracted from the total amount of people in nursing homes. The remaining 54.568 will be distributed to the levels four, five and partly to three (table 5.1). Because of this the number of people in level three living in nursing homes is estimated to be 14.187, the number of people who are in level four is estimated to be 24.201 and the number of people who are in level five is estimated to be 16.182. For the calculation we need the average costs for people in need

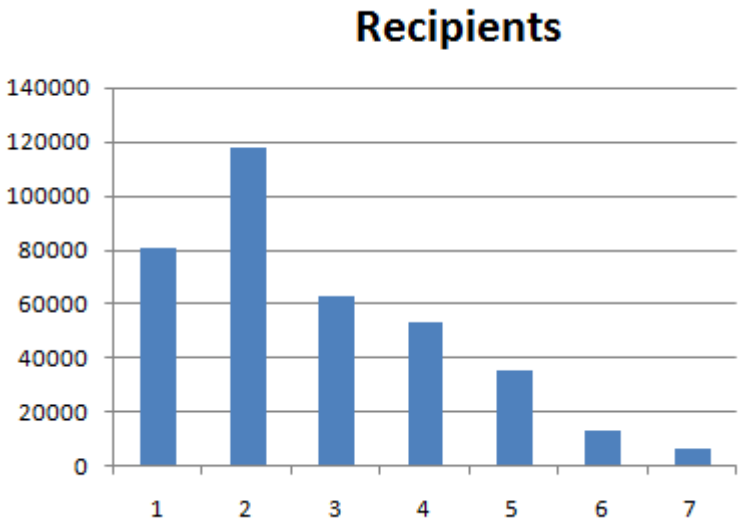


Figure 5.1: Distribution of the level of care in 2011 [STA2011c]

of care which have the level of care 4 and are living in nursing homes. As seen in table 5.13 according to our estimation 24.201 people with care level four are living in nursing homes. The monthly costs of nursing homes for a person with level of care four is taken out of [BMA2013], the numbers can also be seen in table 5.13. Based on them the average cost of a nursing home in Austria is 3.145,40 Euro per month (table 5.3). This price will be used for the following calculation.

To cover the costs of the stationary service, 80% of the nursing allowance and 80% of the pension are used [MÜH2006]. The remaining costs will be covered by the state if there are

no other means that could cover the costs. In Austria, the average pension is about 1.110 Euro [STA2011d]. As 80% of the pension is used to pay for the stationary service and 80% of the care allowance for level of care four is 531.44 Euro, there would be 1.419,44 Euro available to cover the care costs. The difference between the monthly costs of a nursing home and the available money of the older person is 1.725,96 Euro (called ”cost difference” in the following). These costs have to be covered by the state. Thus the Austrian state has costs of about nursing allowance (664,3) + ”cost difference” (1.725,96) = 2.390,26 Euro for every person who cannot live at their own home per month.

| **Distribution of the level of care 3 to 7** | |
|---|---|
| **Level of care** | **Number of recipients** |
| 3 | 14.187 |
| 4 | 24.201 |
| 5 | 16.182 |
| 6 | 13.510 |
| 7 | 6.711 |

Table 5.1: Distribution of federal care allowance recipients which are in nursing homes in terms of the level of care 3 to 7 [STA2011c]

If one has a look at the numbers of the people in nursing homes with level of care 4 (24.201), which is the assumed average level to move to nursing homes, and multiplies them with the costs which the state has to pay for one person who lives in a nursing home (2.390,26), then the monthly costs for the state are 57.846.682,26 Euro. The nursing allowance is always the same, no matter if the people are living at home or in nursing home. But the state could possibly save money by reducing the ”cost difference”. For the following examples we assume that the reduction of the ”cost difference” will be 100% if the person is not living in a nursing home. The real reduction of the ”cost difference” for different care concepts will be addressed in the conclusion of this section.

### Estimations

If only 10% of people in nursing homes with the level of care 4 (2.201), could stay at their own homes, then the potential savings for the Austrian state would be about 3.798.837,96 Euro per month. This would be 45.586.055,52 Euro in one year.

If it can be accomplished that 20% of the people in need of care can live one month longer at their home the state can save up to 7.597.675,92. This sums up to 91.172.111,04 Euro per year.

Increasing the number of persons not held in the nursing home to 50% (12.101) it can be seen

that the state could save up to 20.884.978,98 Euro a month and 250.619.747,76 Euro in the year.

These numbers show that the expenditure for developing Ambient Assisted Living projects can pay off for the state, because with the help of AAL it is possible to increase the time an older person in need of care can live at their own home.

In figure 5.2 an overview of the possible savings can be seen.

**Distribution of federal care allowance recipients in terms of the level of care**

| Year | Recipients total | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Costs in mio. EUR |
|---|---|---|---|---|---|---|---|---|---|
| 2001 | 292.019 | 54.485 | 109.551 | 50.304 | 43.594 | 23.460 | 6.410 | 4.215 | 1.426,9 |
| 2002 | 303.528 | 58.830 | 109.891 | 52.285 | 45.720 | 24.960 | 7.092 | 4.750 | 1.433,0 |
| 2003 | 307.999 | 62.172 | 109.944 | 52.507 | 46.365 | 25.085 | 7.090 | 4.836 | 1.470,6 |
| 2004 | 320.258 | 67.039 | 111.971 | 53.348 | 48.830 | 26.069 | 7.758 | 5.243 | 1.489,3 |
| 2005 | 323.288 | 70.437 | 112.150 | 52.865 | 49.215 | 25.409 | 8.052 | 5.160 | 1.566,4 |
| 2006 | 337.322 | 74.294 | 115.455 | 54.986 | 51.458 | 26.578 | 8.848 | 5.703 | 1.621,4 |
| 2007 | 351.057 | 76.444 | 119.086 | 57.372 | 53.942 | 28.397 | 9.732 | 6.084 | 1.691,5 |
| 2008 | 358.545 | 78.004 | 121.587 | 59.091 | 54.881 | 28.543 | 10.210 | 6.230 | 1.774,3 |
| 2009 | 365.810 | 76.522 | 121.253 | 60.775 | 54.249 | 33.389 | 12.644 | 6.978 | 1.943,1 |
| 2010 | 372.763 | 78.901 | 124.522 | 62.118 | 53.750 | 34.092 | 12.820 | 6.560 | 2.002,2 |
| 2011 | 371.198 | 81.082 | 117.803 | 62.765 | 53.533 | 35.794 | 13.510 | 6.711 | 2.070,6 |

Table 5.2: Distribution of federal care allowance recipients in terms of their level of care [STA2011c]

| **Average number and costs of people in level of care 4 and living in nursing homes** | |
|---|---|
| **Number of people** | 24.201 |
| **Costs per person/month (in EUR)** | 3.145,40 |
| **Costs per person/year (in EUR)** | 37.744,80 |

Table 5.3: The average costs and number of people in level of care 4 and living in nursing homes per month and per year

### 5.1.2 Scenario 2

The second scenario is based on the change from one level of care in the next higher level. This will show how much the change between the different levels of care can be and how much money the Austrian state could save, if the change to the next higher level could be postponed.

| Average costs for the Austrian State for nursing homes (in EUR) | |
|---|---|
| **Costs per person/month** | 3.145,40 |
| **80% of nursing allowance level of care 4** | - 531.44 |
| **80% of pension** | - 888 |
| **"Cost difference" per month** | **1.725,96** |

Table 5.4: The average costs for the Austrian State for a person in nursing homes

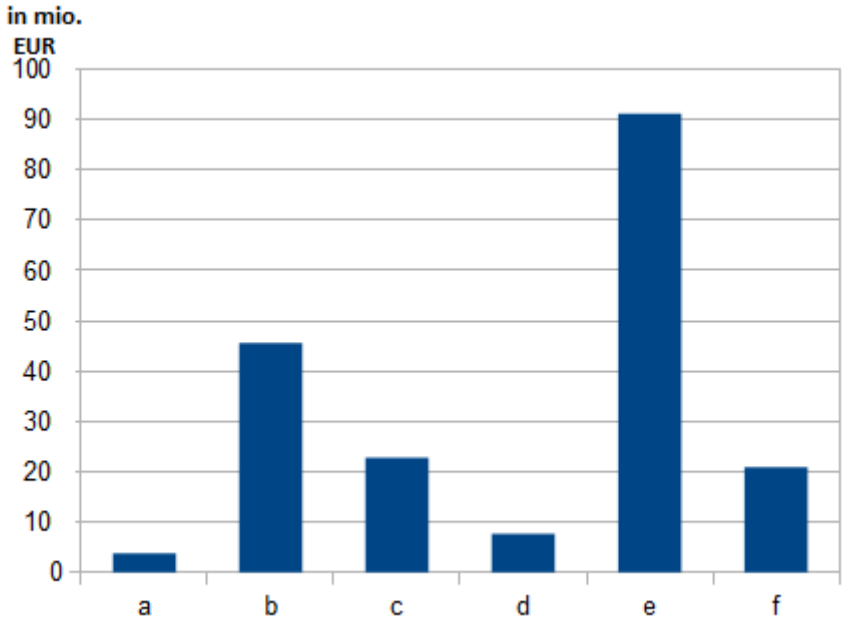


Figure 5.2: Possible savings for the Austrian state in different scenarios regarding the costs of the change in living situations. a) 10% of people in nursing homes with the level of care 4 could stay at their own homes instead of living in a nursing home, possible savings per month; b) 10% of people in nursing homes with the level of care 4 could stay at their own homes instead of living in a nursing home, possible savings per year; c) 10% of people in nursing homes with the level of care 4 could stay at their own homes instead of living in a nursing home, savings for six month; d) 20% of people in nursing homes with the level of care 4 could stay at their own homes instead of living in a nursing home, per month; e) 20% of people in nursing homes with the level of care 4 could stay at their own homes instead of living in a nursing home, per year; f) 50% of people in nursing homes with the level of care 4 could stay at their own homes instead of living in a nursing home, per month

### Construction of scenario 2

For this scenario one has to start with a specific level of care. In this case the second level of care will be used. Because this is the level of care with the highest number as can be seen in

figure 5.1. About 117.803 people are classified in the level of care 2. The nursing allowance in this level is 284,30 Euro. The nursing allowance of the next higher level of care is 442,90 Euro. The difference between this two levels in regard of the nursing allowance is about 158,60 Euro. That would be an increase in costs of 1.903,20 Euro in one year for one person, as can be seen in table 5.5. On the other side the costs for a person in need of care will also get higher because the number of hours rises from 85 by 35 hours to 120 hours.

It is assumed that about 10% of the people in care level two will be upgraded to level of care three within one year. This number is just an assumption because of the lack of information about how many people change into the next higher level of care in one year. 10% seems to be a reasonable assumption. Therefore, the following estimation will be calculated based on this number.

The change from level of care two to the next level of care, will cost the state about 22.420.266,96 Euro in one year, calculation can be seen in table 5.6. It would be beneficial if this step could be postponed and to reduce this number. If instead of 10% only 5% would move to the higher level, this would mean a reduction of yearly costs about 11.210.133,48 Euro.

The hourly rate for Medical Orderlies, for a person with a pension of 900,- Euro, is 17,60 Euro (see table 3.2). The move to a higher level of care would mean a rise of monthly costs for people in need of care about 616 Euro. This difference is not covered by the rise of the care allowance. If it is not possible for a person to pay for the needed help, then they will request state benefit. Which means that the costs for the state will increase again. It would be advantageous to use

| **Calculation of the increase of the nursing allowance** | |
|---|---|
| Nursing allowance - level of care 3 | 442,90 |
| Nursing allowance - level of care 2 | - 284,30 |
| Additional costs for the Austrian state per month/person | 158,60 |
| **Additional costs for the Austrian state per year/person** | **1.903,20** |

Table 5.5: Calculation of the increase of the nursing allowance if a change of the level of care is needed

| **Calculation of the additional costs for level change per year for all people in level of care 2** | |
|---|---|
| Number of people in level of care 2 | 117.803 |
| Additional costs per year | 224.202.669,60 |
| Costs of the level upgrade for 10% of the people in level 2 into level of care 3 | **22.420.266,96** |
| **Reduction of costs if only 5% of the people change level** | **11.210.133,48** |

Table 5.6: Calculation of the additional costs per year for all people in level of care 2 and the reduction of costs if instead of 10% just 5% are upgraded into level of care 3

means which would help to prevent the change of level from happening. This could be achieved with the help of Ambient Assisted Living.

### 5.1.3 Conclusion

In this section two different scenarios have been considered. Scenario 1 showed the change from living at home to living in a nursing home. To consider the results of the scenarios it can be seen that it would be a large benefit for the state, if people in need of care would be able to live in their own home instead of nursing homes. The reduction of the ”cost difference” to zero, as was assumed in scenario 1, is not invariably the case. The real reduction depends on the care form used instead of the stationary service. There are no numbers especially for level of care four for all care concepts in Austria, but we can compare the total costs without differentiating between care levels. Of course this is simplifying, but it can be helpful to show a trend. In table 5.7 the ”cost differences” from 2011 according to [STA2011b] are shown. These numbers show the total costs for care services after the reduction of the nursing allowance, pension or other means (money from relatives, one's own assets, etc.). As can be seen the ”cost differences” of stationary services are the highest. Because of this it can be assumed that the ”cost differences” could be reduced if the use of stationary services can be avoided.

| **Overview of the ”cost difference” for the state in the different care forms per person per year** | |
|---|---|
| **Care form** | **Net expenditure per person (in EUR)** |
| Mobile services | 2.245,80 |
| Stationary services | 15.244,95 |
| Adult day-care services | 3.647,80 |
| Alternative forms of living | 6.181,08 |

Table 5.7: Overview of the ”cost difference” for the state in the different care forms per person per year after reduction of nursing allowance, pension or other means (Based on table 3.8).

In Scenario 2 the change from one level of care to another one is considered. The costs for the state in these situations have different extents. It can be seen that the costs of a change in level of care are lower than the costs of the change from living at home to living in a nursing home. In figure 5.3 it can be clearly seen that the highest costs for the state are at the change of living accommodation.

It would be most beneficial for the state if the person in need of care is living at home and a change of level of care could be prevented.

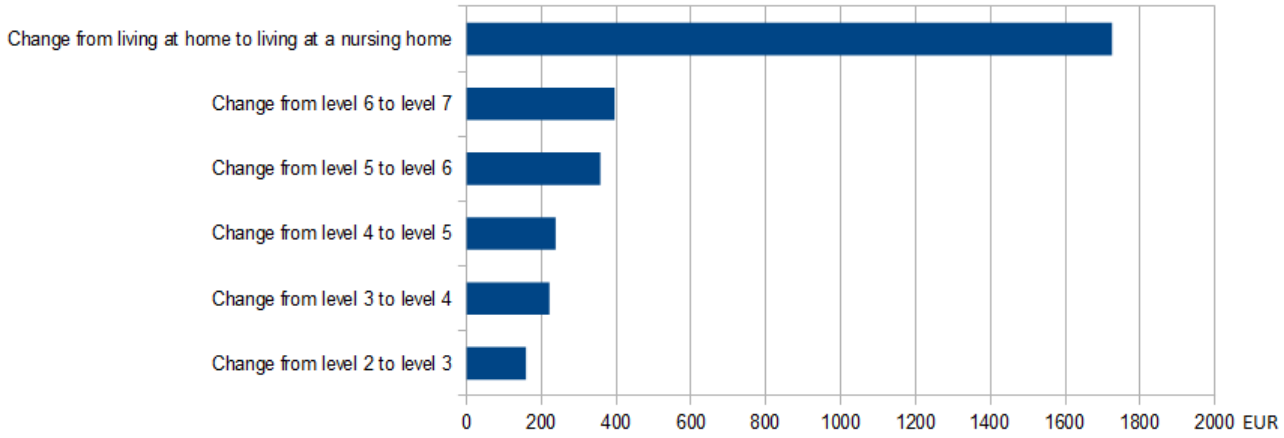


Figure 5.3: Additional monthly costs of the change from one level care to another one and the costs of the change of living accommodation

## 5.2 The positive influence of AAL

It is possible to draw some conclusions with the help of the survey from chapter 4, regarding the extension of the duration a person can live longer in their own home.

As can be seen in table 5.8, the result of the survey shows that the estimation of the companies are very promising. Most companies assume an extension of the independent life from one to more than two years through the use of their projects/products. Of course, this information must be viewed with caution, as the responses of the firms are probably in regard of the best case and, therefore, very convenient. If the estimations of the companies are correct the Austrian state could save a lot of money, as shown with the scenarios before.

A well-equipped home, in which different AAL technologies are used, facilitates independent living. Often the development costs are relatively high at the start of a project which was confirmed by the survey. No one of the respondents named development costs lower than 0,5 million Euro. The average production costs are about 2.110 Euro. However, all of the products can be further used and the manufacturing costs of a product have only to be paid once.

The estimation of the companies regarding the quality of life are also very positive. Most of them estimate the rise in quality of life as high which means that the quality of life of older people should increase with the help the AAL of the projects/products/services.

The combination of different AAL projects would be most beneficial. AAL projects which facilitate activities of daily life for older people so that they don't need help with certain things for which they would normally need help. This would reduce the number of hours in which a

person needs care.

| Information out of the survey about development costs, cost of production, price of products and extension of independent life | | | | | | |
|---|---|---|---|---|---|---|
| | **Development costs (in EUR)** | **Production costs/ product (in EUR)** | **Price of product rent (end user) (in EUR)** | **Price of product (end user) (in EUR)** | **Extension independent life (Year)** | **Further use in new Environment** |
| 1 | 1.000.000 - 5.000.000 | | | | > 2 | Yes |
| 2 | 500.000 - 1.000.000 | 5.000 - 15.000 | | 5.000 - 10.000 | > 2 | Yes |
| 3 | 1.000.000 - 5.000.000 | 1.000 | 50 | 1.000 | 1 | Yes |
| 4 | 500.000 - 1.000.000 | 2.000 | | 1.000 + 150/month | > 2 | Yes |
| 5 | 1.000.000 - 5.000.000 | 600 | 60 - 80 | | 2 | Yes |
| 6 | 1.000.000 - 5.000.000 | 1.000 | 75 | 1.000 | 1 | Yes |
| 7 | 500.000 - 1.000.000 | 500 | 30 | 500 + 10/month | 1 | Yes |
| 8 | > 5.000.000 | 4.000 - 6.000 | 30- 60 | 60 - 130 /$m^2$ + 5 - 20/month | > 2 | Yes |
| 9 | 1.000.000 - 5.000.000 | 1.000 | 50 | 1.000 | > 1 | Yes |
| 10 | 500.000 - 1.000.000 | 1.500 | 30-50 | | > 1 | Yes |

Table 5.8: Development costs, cost of production, price of products, estimation of the companies regarding the extension of the independent life with the help of their product [figures taken out of responses from new survey]

## Cost example of an AAL product

To give an example of the costs of an AAL product, the information gathered with the help of the survey is used. Out of the responses one project is picked and will be described in this section.

A company, which did not wish to be named, has an AAL product in the main section of health which has the aim to allow regular monitoring of vital signs in their own homes including audio-visual consultation with the attending doctor or supervisory team. The target groups are private and public institutions.

It is a product for long-term treatment or long-term telemonitoring of people with chronic medical conditions in their own home, without having to constantly receive a visit from mobile nurses, or to have to go to routine examination to the doctor or to the hospital. Potential test parameters are blood glucose, blood pressure, blood clotting, weight, lung function, oxygen saturation, ECG and pulse. These data are automatically transmitted to the data server with the help of measuring instruments and can be retrieved by the support staff. Further included is a video conferencing tool for audio-visual contact with doctors and caregivers. This product is of use in all seven level of care.

The company estimates that the stay at home may be extended for at least twelve months through the use of this product. If this goal can be achieved the Austrian state could save about 10.500 Euro per year and person. These savings have been calculated by using the figures from scenario 1 (section 5.1). The costs of the product can be taken out of table 5.9. When one person buys this

| **Costs of product in Euro** | |
|---|---|
| Development costs | 1.000.000 - 5.000.000 |
| Price of product at sale | 1.000 |
| Price of product at rent (per month) | 50 |

Table 5.9: Development costs and price of product [numbers taken out of responses from new survey]

product the Austrian state can save up to 20.711,52 Euro. One thousand Euro is a lot of money for a person in need of care, a lot of them can not afford this. If the state finances the purchase of the product for the older person, it has a non-recurring expense of 1.000 Euro. In the long term the possible savings of about 20.700 Euro are worth the investment at the beginning, if that person can continue to live independently at home instead of living in a nursing home. A lease of the product is also possible. This would cost about 50 Euro per month, which would amount to 600 Euro a year.

Taking into account the development costs to market entry, which are between 1 million to five million Euro, and the price per piece of 1.000 Euro. It can be said that after a sale of one to five thousand products the development costs would be covered.

## 5.3 Funding and Business model

There are different possibilities to finance AAL projects. One way is to find investors which would provide money for the development of AAL projects. An investor is a person who commits money with the expectation of financial return. Therefore, one has to find potential investors and present them plans regarding the project and convince them to invest their money into it. Another way to fund AAL projects is with grants provided by the Austrian state.

### Why should Austria provide grants

There are different reasons why it would be beneficial for the Austrian state to provide grants. A consequence of approved grants is that a AAL project can be developed and this is leading to create new jobs. This will lead to an increase of the state income in form of taxes which has to be paid for every working person in Austria in form of income taxes. The income taxes in Austria depend on the income. The table 5.10 provides an overview about the income tax wages

in Austria. When the product is ready for sale and will be sold the value added tax has to be paid, which also goes to the Austrian state. The amount of the value added tax is 20% [BMF2013a].

| Income tax rate | | | |
|---|---|---|---|
| **Income in EUR** | **Income tax in EUR** | **Average tax rate** | **Marginal rate of tax** |
| <= 11.000 | 0 | 0% | |
| 11.000 - 25.000 | [(Income - 11.000)x5.110]/14.000 | - | 36,50% |
| 25.000 | 5.110 | 20,44% | 43,2143% |
| 25.000 - 60.000 | 5.110+[(Income - 25.000)x15.125]/35.000 | - | 43,2143% |
| 60.000 | 20.235 | 33,725% | 43,2143% |
| > 60.000 | 20.235 + (income - 60.000) x 0,5 | - | 50% |

Table 5.10: Income tax rate in Austria [BMF2013b]

**Simple example**

It will be looked at a hypothetical project with development costs of 2.000.000 Euro. An also hypothetical small company will work on this project. The number of employees which are working on the project is 15. The company needs a grant from the Austrian state, so that they can work on the project. Let's see what happens if Austria gives a grant of 0,5 million Euro. With this grant the 15 employees will work on this project. It is assumed that the average income of these employees is about 60.000 Euro. This means that the average income tax per employee would be 20.235 Euro in one year. For 15 employees it would be 303.525 Euro which the Austrian state would get in the form of income taxes. But that is not the only tax the State would get. If the development and production process is finished and the product is for sale the State would get 20% of the price in form of value added tax, as mentioned before. The price of the product would be 1.000 Euro. The value added tax would be 200 Euro per sold product. If 2.000 products are sold, the Austrian state would get 400.000 Euro in form of the value added tax. As can be seen the Austrian state could get the money, which was invested back in form of taxes than it paid in form of grants.

Of course this is a very simple example. But through this example it can be seen that the funding of such a project can be beneficial for Austria. Also if one don't consider the saving potential by the use of AAL, which where described before, it can be seen that through the reflation the development costs could be covered.
It's not only the financial aspects which should be considered. Through the promotion of AAL projects, Austria will look good in they eyes of other countries. It looks good when Austria does invest in the older generation and their quality of life. The prestige of Austria will rise.

| Number for example | |
|---|---|
| **Development costs in EUR** | 2.000.000 |
| **Number of Employees** | 15 |
| **Price/product in EUR** | 1.000 |
| **Income tax per year** | 20.235 |
| **Value added tax in EUR** | 20% |

Table 5.11: Numbers for example

| Money for the state | | | | |
|---|---|---|---|---|
| **Grant** | **Income taxes** | **Number of sold products** | **Value added tax** | **Money for the state** |
| **500.000** | 303.525 | 2.000 | 400.000 | **703.525** |

Table 5.12: Money for the state

**”Senioren Scheck”**

Another possibility to finance AAL projects in the area of construction could be the planned ”Senioren Scheck” [ORF2013]. The ”Senioren Scheck” is built upon the ”Sanierungs Scheck”. These cheques should be used to upgrade flats and houses to make them suitable for older people. The expenditure for the ”Senioren Scheck” would be according to [ORF2013] about 15 to 20 million Euro a year. It should be able to get the ”Senioren Scheck’ as of 2014.

It would also be possible to finance an AAL project in the way of crowd funding which will be discussed in the following section.

**Crowd-funding**

Crowd-funding is a new way to raise money for a new project. In this model the role of the consumer changes. Where as before a consumer was just a consumer who buys a product, he/she will in this model also be an investor. A small to medium-sized investment will be collected from a crowd [ORD2009], therefore the name crowd-funding. This investment will be used for the project.

Three groups of participants are involved in crowd-funding.

- The subjects who propose ideas and projects to be funded.
- The crowd of people that supports these projects.
- A crowd-funding organisation.

With the help of crowd-funding the subjects who propose projects to be funded get direct access to the market and potential customers. Through the financing by customers they have the advantage that they do have an assured customer group for the product. This can then provide

additional customers by making the product known to their acquaintances.

The crowd-funding organisation brings together the potential investor and those requiring help in funding their projects. As can be seen the crowd-founding is a collective effort by consumers who network and pool their money together. Often this is done via the internet [ORD2011].

This model could be beneficial in the area of funding AAL projects. One advantage of the use of crowd funding is that the company can estimate the number of people which are interested in the project. Another possible advantage is the word-of-mouth propaganda through the crowd. This way a customer base can be established.

| **Monthly costs of Stationary services in level of care 4 (in EUR)** | |
|---|---|
| **Province** | Costs |
| Burgenland | 2.306,70 |
| Burgenland | 2.793,60 |
| Carinthia | 2.904,11 |
| Carinthia | 2.721,40 |
| Carinthia | 2.904,11 |
| Carinthia | 2.981,99 |
| Carinthia | 4.151,40 |
| Carinthia | 2.982,00 |
| Carinthia | 2.801,00 |
| Lower Austria | 4.230,90 |
| Salzburg | 2.539,50 |
| Salzburg | 2.925,60 |
| Styria | 3.158,10 |
| Styria | 2.996,80 |
| Styria | 3.119,50 |
| Styria | 2.767,70 |
| Styria | 3.119,50 |
| Styria | 2.896,30 |
| Styria | 2.415,50 |
| Tirol | 3.018,00 |
| Tirol | 3.024,00 |
| Tirol | 2.700,00 |
| Tirol | 2.910,00 |
| Tirol | 3.309,90 |
| Upper Austria | 3.207,58 |
| Upper Austria | 3.714,44 |
| Upper Austria | 3.605,94 |
| Upper Austria | 3.222,88 |
| Upper Austria | 2.856,88 |
| Upper Austria | 3.801,24 |
| Upper Austria | 2.687,00 |
| Upper Austria | 2.310,80 |
| Vienna | 4.200,00 |
| Vienna | 4.283,10 |
| Vienna | 4.283,10 |
| Vienna | 4.226,40 |
| Vienna | 4.164,70 |
| Vorarlberg | 3.408,30 |
| Vorarlberg | 3.605,10 |
| Vorarlberg | 2.213,40 |
| Vorarlberg | 4.007,10 |
| **Average** | **3.145,40** |



Table 5.13: Monthly costs of Stationary services in level of care 4 [BMA2013])

CHAPTER 6

# Database and Web application

## 6.1 General Information

The web application portAAL.at is the Austrian communication and information platform for Ambient Assisted Living and it is a central point of contact for different firms with their AAL projects. It should give an overview about different AAL projects and their category (mobility, security, health, etc.) and information about what goes on in the AAL community. It should also be possible to see in which federal state, different AAL projects are located. The web application makes it easier to find the firms with their AAL projects and it is also easier to contact the firms.

In the database all the information about the firms, projects, news, announcements, links and literature are saved. The web application gets all information shown on the website from the database.

### Target group

There are different target groups for this web application. One target group are people who are interested in the area of Ambient Assisted Living and want to get an overview of the different kinds of AAL projects/products/services. Also older people and their families are a target group, because here they can get information about all kinds of AAL. They can get inspiration how they can make their home senior friendly. Another one are people and firms who are active in the area of Ambient Assisted Living and want to have their projects/products/services presented on the website. People who are looking for partners can get contact information of potential ones.

## 6.2 Web application

Presently, there is no central point of contact in the area of AAL in Austria where one can find information about the different AAL projects/products/services. Because of this the web application portAAL.at was created. The web application is a central point of contact for the AAL community. There, one gets the latest news and information about AAL projects and events. One gets also information about individual projects in the area of AAL. A lot of literature will be presented on the website for every ones use. It is also possible to get the contact information about different firms, so that one can get into contact with them.

Let's have a look at the web application and it's features. On the start page of portAAL.at a


Figure 6.1: portAAL.at start page

welcome screen is shown with the latest news and events in the area of Ambient Assisted Living as can be seen in figure 6.1.

For a person who is not registered on the website portAAL.at, the following menu items can be used, in a non editing way. These can also be seen on the screenshot in figure 6.3.

- **News** is the menu point in which all news of the website are presented. All new dates and events are listed, also the new announcements are shown there. It is also possible to see the newest AAL projects added in the news, if the author of the project enables it.
- **AAL projects** is the menu point in which one can see all AAL projects. The projects are distinguished into Austrian AAL projects and European AAL projects. A short overview and summery of the existing projects are shown.
- Under the menu point **Dates and events** a calender with planned events can be seen. It is possible to switch the calender view to a list view, where all events are listed.

- Calls for proposals and **tenders** are listed in this menu point. Here it is also possible to switch between calender view and list view.
- The menu point **Links** contains links to AAL relevant websites, with a short description.
- Under the menu point **Addresses** one can find addresses of AAL relevant institutions and contact persons.
- **Literature** is the menu point where one can find different AAL relevant reports or papers with a short description.
- Under the menu point **Persons/Institutions** contact information about persons and institutions, which are active in the area of AAL, can be found.

It is necessary to be registered and logged in on the web application to add or edit the content of the mentioned menu items. It has to be noted that only the author of the content can edit or delete it. It's not possible to edit/delete a content which the logged in person hasn't created. Only the administrator has the right to edit/delete content which he/she has not created.


Figure 6.2: portAAL.at registration form

To register on the website one has to navigate to the menu item "Intern" and then select the item register. Then one gets to the registration page with the registration form, as can be seen in figure 6.2. This form has to be filled out correctly. The important fields for the registration are e-mail, user type and password. Depending on the user type, which can be a user or an institution, the fields, name and surname for user or institution name for institution, will be shown and have to be filled out correctly. The password has to have a minimum length of 5 and a maximum length of 20 characters. For the human verification an captcha has to be typed in.

Then the registration process on user side is over. To finish the registration the administrator has to confirm the registration and the user will get a conformation e-mail. After this the user can login on the website and use the edition menu items which are shown under the menu point ”intern”.


Figure 6.3: portAAL.at menu point ”intern”, logged in as user

- **My data**
  Here it is possible to change the password and the profile data of the user.

- **AAL projects administration**
  Under this point the user can add, update or look at their own projects. Also the status of the project can be seen, if it is activated or not. The activation can only be done by the administrator. Before a project is activated by the administrator, the project will be checked. The screenshots in figure 6.4 and 6.5 shows the form to add a new project and how the detail view of a project looks like.

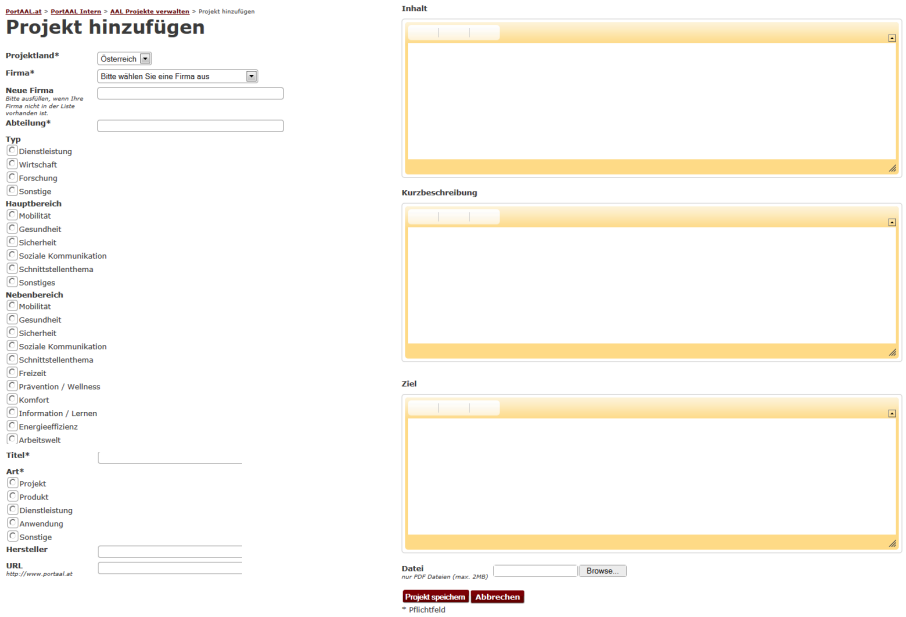


Figure 6.4: portAAL.at add new project

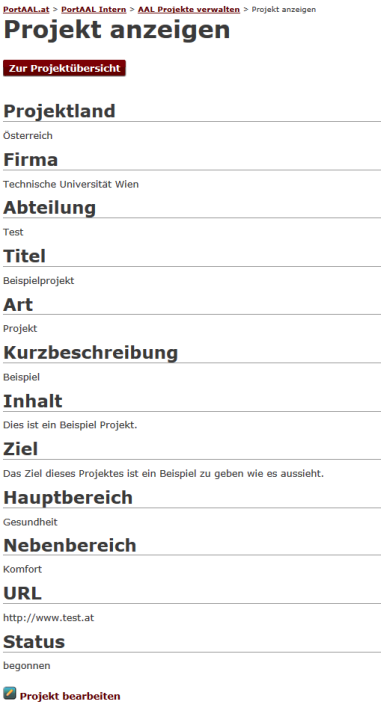


Figure 6.5: portAAL.at Details of the AAL project

- **Dates and events administration**
  New events can only be created, if categories are available. The administrator is responsible for the creation of categories.

- **Tenders administration**
  Tenders are listed and it is possible to create new tenders. The form for this can be seen in figure 6.6.


Figure 6.6: portAAL.at new tender

- **Link administration**
  A list of the links created by the user can be seen and new links can be added. To add a new link, it is required that the administrator has created categories for the links as described for events.
- **Address administration**
  This menu point is nearly the same as the link administration just with addresses.
- **Literature administration**
  Here one sees a list of the available literature and new literature can be added in specific categories, which have to be created by the administrator.
- **Logout**

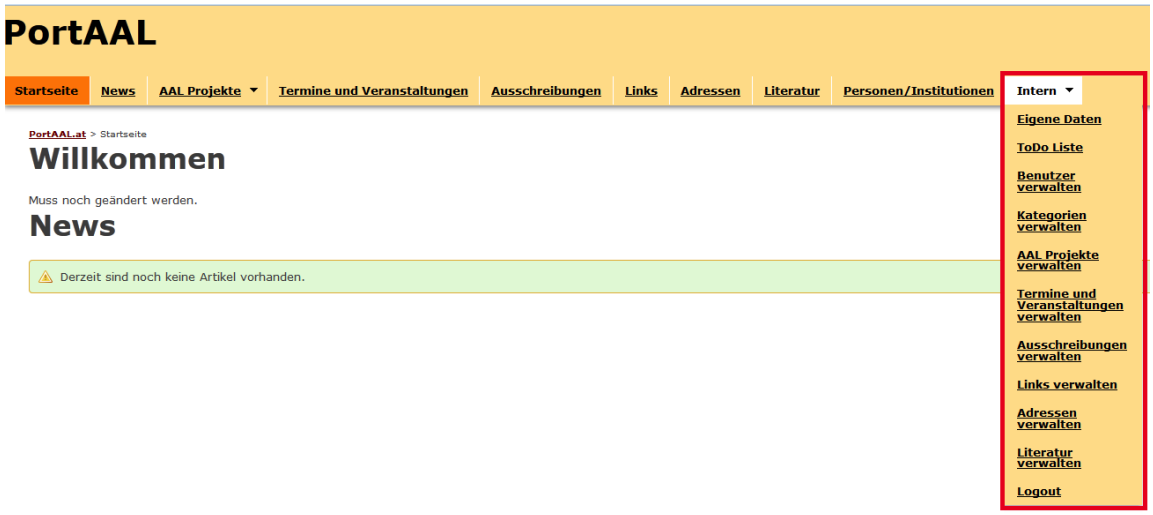


Figure 6.7: portAAL.at menu point ”intern”, logged in as administrator

An administrator has more rights than a normal user and, therefore, he/she has additional menu items, these can be seen in figure 6.7. The additional menu items are:

- **ToDo List**
  Here the administrator has an overview what he/she has to do. It is shown if he/she, has to manage and activate new projects or users.
- **User administration**
  A list with all users is displayed (see figure 6.8). It is possible to filter the displayed users, so that only the blocked, active or new users are shown. The administrator has the right to activate, delete or block an active user. He/she has also the right to make a user an administrator or to take the administrator rights from users.


Figure 6.8: portAAL.at user administration, administrator

- **Category administration**
  A list of categories is shown which can be edited. It is possible for the administrator to add new categories for links, addresses, literature and events. The form can be seen in figure 6.9.


Figure 6.9: portAAL.at add new category, administrator

## 6.3 Non-functional requirements

A very important non-functional requirement is accessibility. This is because it should be possible for everyone to get all the information of the website. Another reason is that a lot of older people have some kind of disability and the content of the website should be easily accessible for them. Therefore, the guidelines of the Web Accessibility Initiative (WAI), Web Content Accessibility Guidelines 2.0 (WCAG), [W3C2008] are applied.

### Web Content Accessibility Guidelines 2.0

The WCAG are guidelines to make the web content more accessible. These guidelines help to make content accessible to a wider range of people with disabilities. This includes people who are blind, with low vision, deaf people, people with hearing loss, a learning disability, cognitive limitations, limited movement, speech disabilities and photosensitivity.

**Perceivable** means that user interface components and information must be presentable to users in ways they can perceive.

- Text alternatives have to be provided for any non-text content. This is important so that the content can be changed into different forms such as braille, speech or symbols.
- An alternative for time-based media has to be provided. For example an alternative text should be provided for pre-recorded video- or audio-media.
- Content has to be created in a way that it can be presented in different ways without the loss of information or structure, for example a simpler layout.
- The content has to be distinguishable. It should be easy for users to see and hear content.

**Operable** means that the user interface components and navigation must be operable.

- It should be possible to use all functionality with the keyboard.
- Users should have enough time to read and use content.
- The content should not be designed in a way that is known to cause seizures.
- Provide ways to help users navigate, find content, and determine where they are.

**Understandable** means that the information and the operation of user interface must be understandable.

- The text content should be readable and understandable.
- Web pages have to appear and operate in predictable ways.
- Help users avoid and correct mistakes.

**Robust** means that content has to be robust enough that it can be interpreted reliably by a wide variety of user agents.

- One has to maximize compatibility with current and future user agents, including assistive technologies.

Another important non-functional requirement is privacy. Privacy is important in the way that the user can determine which information can be seen by whom. It is possible that information can only be seen by the user himself or other users. For example, it is possible that the information of the new project will be made public on the news page or not. It is also possible to make the information of the project not public to other users.

## 6.4 Implementation

The technologies used for the web application and the database are PHP and MySQL.

**PHP** [PHP2013] was the short form for ”Personal Home Page”, nowadays it is the acronym for ”PHP: Hypertext Preprocessor”. It is a server side scripting language designed for web development. The PHP code is interpreted by a web server with a PHP processor module which generates the resulting web page. PHP commands can be embedded directly into HTML source documents.

**MySQL** [MYS2013] is an open source relational database management system. SQL stands for Structured Query Language. This is used for the implementation of the database. The construction of the database is shown later in this section.

**JQuery** [JQU2013] is a JavaScript library which does simplify the client-side scripting of HTML. It is used to show changes in the form immediately. For example in the form new project it is used to change the radio buttons shown in the form to create a ”new project”. The radio buttons regarding the state of the project, product or service are depending on the selected type (which are project,product,service) in the form. JQuery is also used to check the input to the required fields.

### Description of the code structure

In this subsection an overview of the program is given to help to understand how it was done and how the different parts are built. The project is divided into ten folders. In these folders are the different classes needed in the web application. The overall structure can be seen in figure 6.10. Now an explanation of the different contents of the folder is given.

- **class**
  In the folder ”class” are all the php classes needed for the processing of information from the database. In these classes are functions like the following: The function getItem(), to get information about a specific item from the database. The function checkItem(),


Figure 6.10: Structure of the folder

which controls the input and saves it in a variable which will be used for the insert or update into the database. The database connection classes are in the sub-folder database. In the database connection classes are the methods to insert, update, select and delete information into or from the database. There are separate classes for each table of the database.

- **config**
  In the config folder the class config.inc.php is important. There are all the settings of the program. The part of the database, as seen in following code listing, with the information about the host, user, password and the database has to be adapted.

```
1 /*************************
2 ######## DATABASE ########
3 *************************/
4 $config->DB_CONN_HOST;
5 $config->DB_CONN_USER;
6 $config->DB_CONN_PASSWORD;
7 $config->DB_CONN_DATABASE;
```

- **data**
  Is a folder with the sub-folders events, links, literature, projects, tender and user. These folders are for additional data and consists of no classes.

- **docs**
  The docs folder contains a file called creates.sql. This sql script contains the information for the generation of the database. This file has to be executed. All create and insert statements for the database are in this file.

- **framework**
  This folder contains a sub folder which consists of the compound class ConnMySQL. This

class is responsible for the connection to the database. The framework folder also contains the following classes.

  - FWConfig.class.php class stores configuration settings.
  - FWDebug.class.php class handles all logging operations.
  - FWFunctions.class.php class provides various functions for the preparation of data.
  - FWModel.base.class.php is a model class of the framework.
  - FWOutVar.class.php class is responsible for the storing of output data.
  - FWView.class.php class is responsible for the preparation of data.
  - FWViewHandler.class.php class is responsible to take requests and invoke appropriate functions for loading and preparing the data, which are shown on the website.

- **includes**
  All libraries and tools used within the program are stored in this folder.

- **log**
  The log folder consists of the log file

- **message**
  In the message folder all message files are saved, which are used for the internationalisation. For each language presented on the website, a message file has to be created with respective translations for each word or phrase used on the site.

- **style**
  In the style order the css style is saved. With the help of css the look and feel of the website can be changed.

- **view**
  The view folder contains all html classes needed. For each event on the website, which needs a new display, a separate html file is needed. There are different displays for the actions that a user can take. For each area (projects, literature, address, events, links, tender) and action (edit, compare, show details, login, error) a separate html file exists.

### Class structure

The starting point is the class index.php which does nothing else then calling the function handle() in the FWViewHandler class. This function takes the current page status and calls the appropriate subhandlers that are necessary to process the request. For each menu item and action on the website the appropriate functions are called by the handlers. These functions are calling the getProtaalInstance($type) function from the FWFunctions class. This function returns the appropriate instance, which is one of the following.

- Literature
- Links

- Projects
- Events
- Users
- Categories
- Address
- Tender
- Wrapper

These instances implement the methods of the interface interfacePortaalItem (see codeblock below). The classes of these instances are located in the folder 'class'. These classes contain the methods which are used to get the data from or into the database or to prepare the data so that they can be inserted into the database. In these methods the functions of the classes which are located in the folder database are called. These return the corresponding queries, which are required for database processing.

```
1 <?PHP
2 interface interfacePortaalItem {
3   public static function getInstance();
4   public function __construct();
5     public function getItemName($type, $itm_id);
6     public function saveItem($type);
7     public function activateItem($type, $item_id);
8     public function blockItem($type, $item_id);
9     public function delItem($type, $item_id);
10    public function compareItems($type, $item_id);
11
12  public function getItems($internal = false);
13  public function getDefaultItem();
14  public function getItem($item_id);
15 }
16 ?>
```

The class structure which has been described up to now is responsible for handling data processing steps.

To display the content of the website HTML pages are used. The HTML classes can be found in the folder view. These classes are called functions in the FWViewHandler.

The FWViewHandler is the central control node which connects the user action to the appropriate function. For example, if the user clicks the 'News' button the action MENU_ NEWS is sent to the FWViewHandler and the FWViewHandler calls the function welcomeScreen() which returns the Welcome screen. For this the welcomeScreen function calls the getNewsScreen()

function which is part of the instance. Then the display function is called which gets the newsScreen HTML page. The HTML page is what is displayed on the screen of the user. Tables 6.1, 6.2 and 6.3 show how the FWViewHandler reacts on different actions.

| Description of actions and functions in FWViewHandler class | | |
|---|---|---|
| **Action** | **Function** | **Description** |
| MENU_ NEWS | welcomeScreen() | Handler for welcome page. It gets a wrapper instance from the FWFunctions class and the news screen. |
| MENU_ PROJECTS | showProjects() | Handler for display of projects. It gets a project instance from the FWFunctions class and calls the method getItemsPaginator($type) to get a list of all projects that will be shown on the page. |
| MENU_ PROJECTS_ AUT | showProjects(AUT) | Handler for display of projects. It gets a project instance from the FWFunctions class and calls the method getItemsPaginator($type) to get a list of all Austrian projects that will be shown on the page. |
| MENU_ PROJECTS_ EUR | showProjects(EUR) | Handler for display of projects. It gets a project instance from the FWFunctions class and calls the method getItemsPaginator($type) to get a list of all European projects that will be shown on the page. |
| MENU_ EVENTS | showCalendar() | Handler for calendar. Shows a calendar with the actual date. |
| MENU_ EVENTS_ SEARCH | eventSearch() | Handler for the event search. It gets the event instances from the FWFunctions class and calls the getSearchEvents() function. The getSearchEvents() function returns all events which had been found. |
| MENU_ EVENTS_ LIST | showEvents() | Handler for displaying events. It gets a event instance from the FWFunctions class and shows the events on the calendar. |
| MENU_ LINKS | showItems(ITEM_ LINK) | Handler for displaying link items. It gets a link instance from the FWFunctions class. |
| MENU_ LITERATURE | showItems(ITEM_ LITERATURE) | Handler for displaying literature items. It gets a literature instance from the FWFunctions class. |
| MENU_ ADDRESSES | showItems(ITEM_ ADDRESS) | Handler for displaying address items. It gets a literature instance from the FWFunctions class. |
| MENU_ TENDER | showTender() | Handler for displaying tender items. It gets a tender instance from the FWFunctions class. |
| MENU_ TENDER_ SEARCH | tenderSearch() | Handler for the tender search. It gets the tender instances from the FWFunctions class and calls the getSearchTender() function. The getSearchTender() function returns all tenders which had been found. |
| MENU_ TENDER_ CALENDAR | showTenderCalendar() | Handler for tender calendar. Shows a calendar with the actual date of the tenders. |
| MENU_ TENDER_ SINGLE | intShowSingleTender() | Handler for displaying a specific tender. It gets a tender instance from the FWFunctions class with a specific id. |
| MENU_ PEOPLE | showItems(ITEM_ USER) | Handler for displaying user items. It gets a user instance from the FWFunctions class. |
| MENU_ CONFORMANCE | showConformance() | Displays the conformance. |
| MENU_ SITEMAP | showSitemap() | Displays the Sitemap. |
| MENU_ FORGOT_ PASSWORD | forgotPassword() | Handler for forgotten password. Returns a form that is used to change a forgotten password. |
| MENU_ RESET_ PASSWORD | resetPassword() | Handler for resetting password. Returns a form that is used to change a password. |
| MENU_ SHOW_ PIC | showPic() | Displays an image. |
| MENU_ INTERNAL_ REGISTER | register() | Handler for registration. Returns a form for the registration. |
| MENU_ INTERNAL_ LOGIN | login() | Handler for login. Returns a form to login. |
| MENU_ INTERNAL_ EDITPW | editPassword() | Handler for editing the password. Returns a form to edit the password of the user. |
| MENU_ INTERNAL_ EDITDATA | editUserData() | Handler for editing user data. Returns a form to edit user data. |
| MENU_ INTERNAL_ ACTIVATE | activate() | Handler for activation. Handles activation of an account. |
| MENU_ INTERNAL_ DATA | intShowUserData() | Handler for display of user data. Returns the data of the user. |
| MENU_ INTERNAL_ HOME | intHomeScreen() | Handler for main page of the internal area.Returns main page for a user. |

Table 6.1: Description of actions and functions FWViewHandler class

| Description of actions and functions in FWViewHandler class | | |
|---|---|---|
| MENU_ INTERNAL_ HOME_ SHOW | intShowHomeScreen() | Handler for displaying home screen. Returns home screen. |
| MENU_ INTERNAL_ USRMGMT | intUserManagement() | Handler for User Management. Returns user data. |
| MENU_ INTERNAL_ USER_ SHOW | intShowUser() | Handler for display users. Returns user. |
| MENU_ INTERNAL_ USER_ ACTIVATE | intActivateUser() | Handler for activating users. Activate users. |
| MENU_ INTERNAL_ USER_ PROFILE_ ACTIVATE | intActivateUserProfile() | Handler for activating User Profile. User profile will be activated. |
| MENU_ INTERNAL_ USER_ BLOCK | intBlockUser() | Handler for blocking user profile. User profile will be blocked. |
| MENU_ INTERNAL_ USER_ PROFILE_ BLOCK | intBlockUserProfile() | Handler for blocking user. User will be blocked. |
| MENU_ INTERNAL_ USER_ DEL | intDelUser() | Handler for deleting users. User will be deleted. |
| MENU_ INTERNAL_ USER_ SETADMIN | intSetUserAdmin() | Handler for making a user to an administrator. Makes a user to an administrator. |
| MENU_ INTERNAL_ USER_ DELADMIN | intDelUserAdmin() | Handler for withdrawing administration rights. Removes administrator rights of an user. |
| MENU_ INTERNAL_ USER_ PROFILE_ INFO | showUserProfileInfo() | Handler for displaying user information. Shows information about user. |
| MENU_ INTERNAL_ CATEGORIES | intShowCategories() | Handler for displaying categories. Displays the categories. |
| MENU_ INTERNAL_ CATEGORIES_ SHOW | intShowCategories() | Handler for displaying categories. Displays the categories. |
| MENU_ INTERNAL_ CATEGORIES_ EDIT | intEditCategory() | Handlers for editing of Categories. Edits the category. |
| MENU_ INTERNAL_ CATEGORIES_ DEL | intDelItem(ITEM_ CATEGORIES) | Handler for deleting category items. Category item will be blocked (depending on type) |
| MENU_ INTERNAL_ PROJECTS | intShowItems(ITEM_ PROJECT) | Handler for displaying project items. It gets a project instance from the FWFunctions class. |
| MENU_ INTERNAL_ PROJECT_ SHOW | intShowProjects() | Handler for displaying of projects. Returns projects. |
| MENU_ INTERNAL_ PROJECT_ SHOW_ DETAILS | intShowDetailsItems(ITEM_ PROJECT) | Handler for displaying project details. Displays project. |
| MENU_ INTERNAL_ PROJECT_ EDIT | intEditItem(ITEM_ PROJECT) | Handler for editing project. The project will be edited. |
| MENU_ INTERNAL_ PROJECT_ ACTIVATE | intActivateItem(ITEM_ PROJECT) | Handler for activating a project. Project will be activated. |
| MENU_ INTERNAL_ PROJECT_ BLOCK | intBlockItem(ITEM_ PROJECT) | Handler for blocking a project. Project will be blocked. |
| MENU_ INTERNAL_ PROJECT_ DEL | intDelItem(ITEM_ PROJECT) | Handler for deleting a project. Project will be deleted. |
| MENU_ INTERNAL_ PROJECT_ COMPARE | intCompareItems(ITEM_ PROJECT) | Handler for comparing projects. Project will be compared. |
| MENU_ INTERNAL_ LINKS | intShowItems(ITEM_ LINK) | Handler for displaying link items. It gets a link instance from the FWFunctions class. |
| MENU_ INTERNAL_ LINKS_ SHOW | intShowLinks() | Handler for displaying of links. Returns links. |
| MENU_ INTERNAL_ LINKS_ SHOW_ DETAILS | intShowDetailsItems(ITEM_ LINK) | Handler for displaying link details. Displays link. |
| MENU_ INTERNAL_ LINKS_ EDIT | intEditItem(ITEM_ LINK) | Handler for editing link. The link will be edited. |
| MENU_ INTERNAL_ LINKS_ ACTIVATE | intActivateItem(ITEM_ LINK) | Handler for activating a link. Link will be activated. |
| MENU_ INTERNAL_ LINKS_ BLOCK | intBlockItem(ITEM_ LINK) | Handler for blocking a link. Link will be blocked. |
| MENU_ INTERNAL_ LINKS_ DEL | intDelItem(ITEM_ LINK) | Handler for deleting a link. Link will be deleted. |
| MENU_ INTERNAL_ LINKS_ COMPARE | intCompareItems(ITEM_ LINK) | Handler for comparing links. Link will be compared. |

Table 6.2: Description of actions and functions FWViewHandler class

| Description of actions and functions in FWViewHandler class | | |
|---|---|---|
| **Action** | **Function** | **Description** |
| MENU_ INTERNAL_ ADDRESS | intShowItems(ITEM_ ADDRESS) | Handler for displaying address items. It gets a address instance from the FWFunctions class. |
| MENU_ INTERNAL_ ADDRESS_ SHOW | intShowAddress() | Handler for displaying of addresses. Returns addresses. |
| MENU_ INTERNAL_ ADDRESS_ SHOW_ DETAILS | intShowDetailsItems(ITEM_ ADDRESS) | Handler for displaying address details. Displays address. |
| MENU_ INTERNAL_ ADDRESS_ EDIT | intEditItem(ITEM_ ADDRESS) | Handler for editing address. The address will be edited. |
| MENU_ INTERNAL_ ADDRESS_ ACTIVATE | intActivateItem(ITEM_ ADDRESS) | Handler for activating a address. Address will be activated. |
| MENU_ INTERNAL_ ADDRESS_ BLOCK | intBlockItem(ITEM_ ADDRESS) | Handler for blocking a address. Address will be blocked. |
| MENU_ INTERNAL_ ADDRESS_ DEL | intDelItem(ITEM_ ADDRESS) | Handler for deleting a address. Address will be deleted. |
| MENU_ INTERNAL_ ADDRESS_ COMPARE | intCompareItems(ITEM_ ADDRESS) | Handler for comparing addresses. Address will be compared. |
| MENU_ INTERNAL_ LITERATURE | intShowItems(ITEM_ LITERATURE) | Handler for displaying literature items. It gets a literature instance from the FWFunctions class. |
| MENU_ INTERNAL_ LITERATURE_ SHOW | intShowLiterature() | Handler for displaying of literatures. Returns literatures. |
| MENU_ INTERNAL_ LITERATURE_ SHOW_ DETAILS | intShowDetailsItems(ITEM_ LITERATURE) | Handler for displaying literature details. Displays literature. |
| MENU_ INTERNAL_ LITERATURE_ EDIT | intEditItem(ITEM_ LITERATURE) | Handler for editing literature. The literature will be edited. |
| MENU_ INTERNAL_ LITERATURE_ ACTIVATE | intActivateItem(ITEM_ LITERATURE) | Handler for activating a literature. Literature will be activated. |
| MENU_ INTERNAL_ LITERATURE_ BLOCK | intBlockItem(ITEM_ LITERATURE) | Handler for blocking a literature. Literature will be blocked. |
| MENU_ INTERNAL_ LITERATURE_ DEL | intDelItem(ITEM_ LITERATURE) | Handler for deleting a literature. Literature will be deleted. |
| MENU_ INTERNAL_ LITERATURE_ COMPARE | intCompareItems(ITEM_ LITERATURE) | Handler for comparing literatures. Literature will be compared. |
| MENU_ INTERNAL_ TENDER | intShowItems(ITEM_ TENDER) | Handler for displaying tender items. It gets a tender instance from the FWFunctions class. |
| MENU_ INTERNAL_ TENDER_ SHOW | intShowTender(ITEM_ TENDER) | Handler for displaying of tenders. Returns tenders. |
| MENU_ INTERNAL_ TENDER_ SHOW_ DETAILS | intShowDetailsItems(ITEM_ TENDER) | Handler for displaying tender details. Displays tender. |
| MENU_ INTERNAL_ TENDER_ EDIT | intEditItem(ITEM_ TENDER) | Handler for editing tender. The tender will be edited. |
| MENU_ INTERNAL_ TENDER_ ACTIVATE | intActivateItem(ITEM_ TENDER) | Handler for activating a tender. Tender will be activated. |
| MENU_ INTERNAL_ TENDER_ BLOCK | intBlockItem(ITEM_ TENDER) | Handler for blocking a tender. Tender will be blocked. |
| MENU_ INTERNAL_ TENDER_ DEL | intDelItem(ITEM_ TENDER) | Handler for deleting a tender. Tender will be deleted. |
| MENU_ INTERNAL_ TENDER_ COMPARE | intCompareItems(ITEM_ TENDER) | Handler for comparing tenders. Tender will be compared. |
| MENU_ INTERNAL_ EVENTS | intShowItems(ITEM_ EVENT) | Handler for displaying event items. It gets a event instance from the FWFunctions class. |
| MENU_ INTERNAL_ EVENTS_ SHOW | intShowEvents() | Handler for displaying of events. Returns events. |
| MENU_ INTERNAL_ EVENTS_ SHOW_ DETAILS | intShowDetailsItems(ITEM_ EVENT) | Handler for displaying event details. Displays event. |
| MENU_ INTERNAL_ EVENTS_ EDIT | intEditItem(ITEM_ EVENT) | Handler for editing event. The event will be edited. |
| MENU_ INTERNAL_ EVENTS_ ACTIVATE | intActivateItem(ITEM_ EVENT) | Handler for activating a event. Event will be activated. |
| MENU_ INTERNAL_ EVENTS_ BLOCK | intBlockItem(ITEM_ EVENT) | Handler for blocking a event. Event will be blocked. |
| MENU_ INTERNAL_ EVENTS_ DEL | intDelItem(ITEM_ EVENT) | Handler for deleting a event. Event will be deleted. |
| MENU_ INTERNAL_ EVENTS_ COMPARE | intCompareItems(ITEM_ EVENT) | Handler for comparing events. Event will be compared. |
| MENU_ INTERNAL_ LOGOUT | logout() | Handler for logout. User will be logged out. |
| MENU_ INTERNAL_ SESSION_ LOGOUT | logout(true) | Handler for logout. Returns logout success. |

Table 6.3: Description of actions and functions FWViewHandler class

## Database

### Structure of the database

The database for the web application consists of eleven tables and it's schema can be seen in figure 6.11. In this figure all tables and their columns are shown. The following tables are in it.

- portaal_ user
- portaal_ literatur
- portaal_ address
- portaal_ countries
- portaal_ categories
- portaal_ events
- portaal_ tender
- portaal_ links
- portaal_ projects
- portaal_ projects_ tasks
- portaal_ projects_ firms

The tables which are important for this work are the table regarding the AAL projects, which are portaal_ projects, portaal_ projects_ tasks, portaal_ projects_ firms and portaal_ user. Because of this a detailed description of this tables will be made. To the existing database, the tables portaal_ projects_ task and portaal_ projects_ firms were added and the table portaal_ projects was extended.

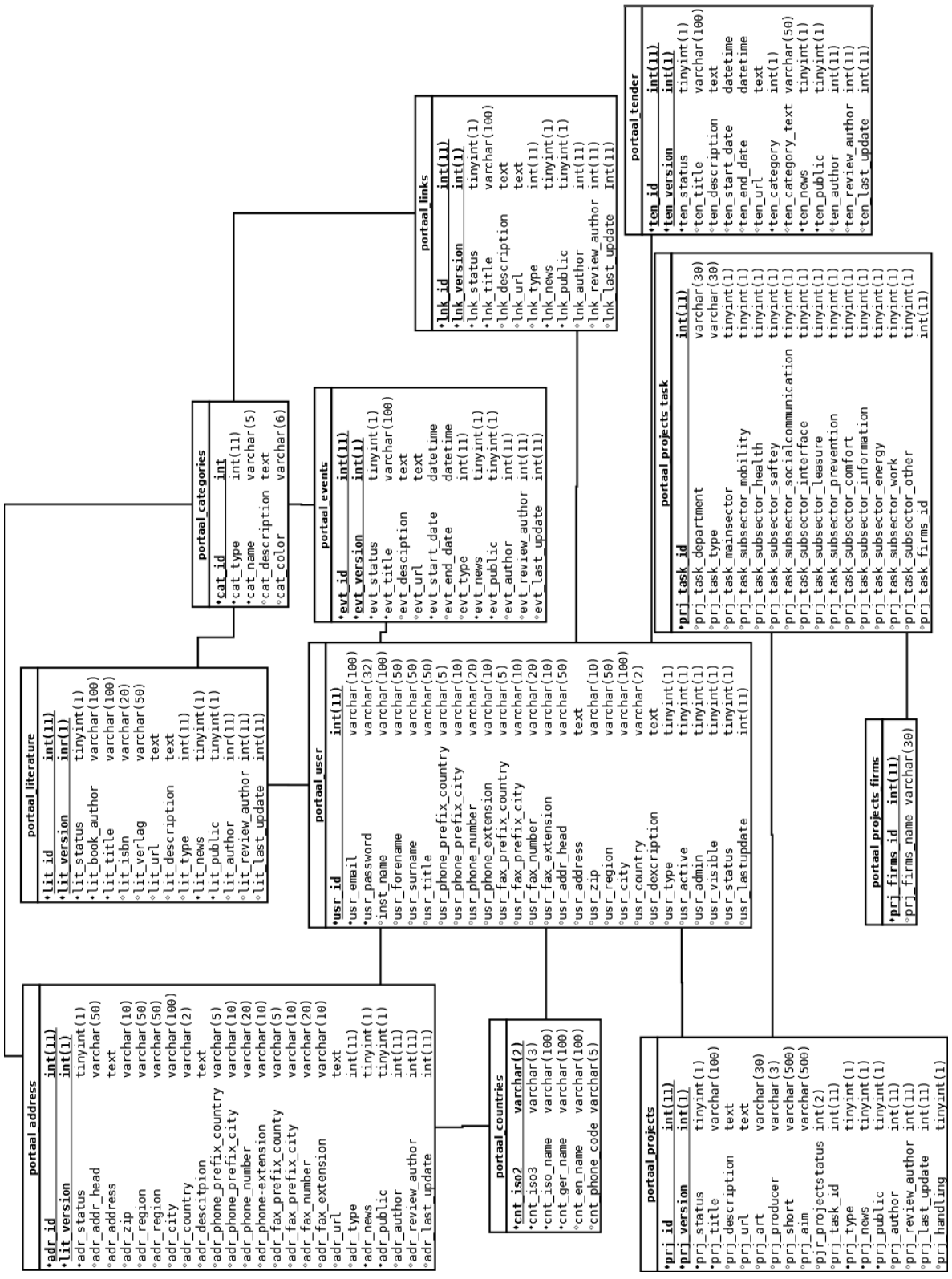


Figure 6.11: Database schema for whole application portAAL.at

### Database import of survey information

LimeSurvey produces xml files. These xml files contain the results from the survey. A converter was programmed which takes the information from the existing survey and creates a SQL script. This SQL script generates the database tables. These script is used to create the new tables in the database and to fill them with the information gathered with the survey.

| | |
|---|---|
| **portaal_ user :** | The user table consist of all informations regarding the user. This table is important for everything part in the program that has user actions. Every other table is directly or indirectly linked to this table. |
| **usr_ id :** | Unique ID of the user table |
| **usr_ email :** | Contains the email address of the user. |
| **usr_ password :** | Contains the password of the user, with which the user can login on the web application. |
| **inst_ name :** | Contains the name of the institution. |
| **usr_ forename :** | Contains the forename of the user. |
| **usr_ surname :** | Contains the surname of the user. |
| **usr_ title :** | Contains the title of the user, if one exist. |
| **usr_ phone_ prefix_ country :** | Contains the phone number prefix of the country in which the user lives. |
| **usr_ phone_ prefix_ city :** | Contains the phone number prefix of the city in which the user lives. |
| **usr_ phone_ number :** | Contains the phone number of the user. |
| **usr_ phone_ extension :** | Contains the phone number extension if one exist. |
| **usr_ fax_ prefix_ country :** | Contains the fax number prefix of the country in which the user lives. |
| **usr_ fax_ prefix_ city :** | Contains the fax number prefix of the city in which the user lives. |
| **usr_ fax_ number :** | Contains the fax number of the user. |
| **usr_ fax_ extension :** | Contains the fax number extension if one exist. |
| **usr_ addr_ head :** | Contains the label of the address |
| **usr_ address :** | Contains the address of the user. |
| **usr_ zip :** | Contains the zip code of the region. |
| **usr_ region :** | Contains the region. |
| **usr_ city :** | Contains the city. |
| **usr_ country :** | Contains the country. |
| **usr_ description :** | Contains a description of the user. |
| **usr_ type :** | The content of this column is 1 if user is an institution and 0 if the user is a normal user. |
| **usr_ active :** | The content of this column is 0 if the user is new, 1 if he is active, 2 if he is new activated and 3 if he is blocked by an administrator. |
| **usr_ admin :** | The content of this column is 1 if user is administrator and 0 if he is not an administrator. |
| **usr_ visible :** | The content of this column is 1 if user is visible for other users and 0 if he is invisible. |
| **usr_ status :** | The content of this column is 0 if the status of the user is new, 1 if the status of the user is active, 2 if the status is blocked and 3 if the status is suspended. |
| **usr_ lastupdate :** | Consists of the date and time when the user was last updated. |

| | |
|---|---|
| **portaal_ projects_ firms :** | Contains the names of the companies. The following columns are in it. |
| **prj_ firms_ id :** | Unique ID of the company. |
| **prj_ firms_ name :** | The name of the company. |
| **portaal_ projects_ task:** | Contains the departments of a company and their area of work. This table consists of the following columns. |
| **prj_ task_ id :** | Unique ID of the Task |
| **prj_ task_ department :** | Department of the company |
| **prj_ task_ type :** | Shows in which field of work a company is active. The different types are research, economy, service provider and others. |
| **prj_ task_ mainsector :** | Contains the main sector of the company, which has to be one of the following; 0...mobility, 1...health, 2...safety, 3...social communication, 4...interface topic or others. |
| **prj_ task_ subsector_ mobility :** | Contains 1 if the sector mobility is true, otherwise 0. |
| **prj_ task_ subsector_ health :** | Contains 1 if the sector health is true, otherwise 0. |
| **prj_ task_ subsector_ safety :** | Contains 1 if the sector safety is true, otherwise 0. |
| **prj_ task_ subsector_ socialcommunication :** | Contains 1 if the sector social communication is true, otherwise 0. |
| **prj_ task_ subsector_ interface :** | Contains 1 if the sector interface topic is true, otherwise 0. |
| **prj_ task_ subsector_ leasure :** | Contains 1 if the sector leisure time is true, otherwise 0. |
| **prj_ task_ subsector_ prevention :** | Contains 1 if the sector prevention / wellness is true, otherwise 0. |
| **prj_ task_ subsector_ comfort :** | Contains 1 if the sector comfort is true, otherwise 0. |
| **prj_ task_ subsector_ information :** | Contains 1 if the sector information / learning is true, otherwise 0. |
| **prj_ task_ subsector_ energy :** | Contains 1 if the sector energy efficiency is true, otherwise 0. |
| **prj_ task_ subsector_ work :** | Contains 1 if the sector working environment is true, otherwise 0. |
| **prj_ task_ subsector_ other :** | Contains 1 if the sector others is true, otherwise 0. |
| **prj_ task_ firms_ id :** | Is the foreign key for the table portaal_ projects_ firms. |

| **portaal_ projects:** | includes all project-related information such as the name, description, aim and project status. this table consists of the following columns. |
|---|---|
| **prj_ id :** | Unique ID of the project, product or service. |
| **prj_ version :** | Contains the version of the project. |
| **prj_ status :** | Contains the information if a project/ product/ application/ service is active (1) or not (0). |
| **prj_ title :** | Name of the project/ product/ application/ service. |
| **prj_ description :** | Description of the project/product/application/service. |
| **prj_ url :** | Contains the url of the homepage for the project/product/application/service, if one exist. |
| **prj_ art :** | Here it is recorded if it is a project, product, application or service. |
| **prj_ producer :** | If it is a third party product then the name of the producer will be in this column. |
| **prj_ short :** | Contains a short description of the project/product/application/service. |
| **prj_ aim :** | Contains the aim of the project/product/application/service. |
| **prj_ projectstatus :** | Contains information about the status of the project/product/application/service. Depending on the art, there are different statuses. If the art is project then the possible statuses are 0...'idea', 1...'submitted', 2...'started', 3...'running', 4...'in transition' and 5...'finished'. If the art is product then the possible statuses are 6...'in production', 7...'for sale' and 8...'in deployment'. If the art is service then the possible statuses are 9...'offered' and 10...'in preparation'. If the art is application then the possible status is 11...'currently in use or distribution'. |
| **prj_ handling :** | Contains 0...private if the project/product/application/service should not be seen by other users and 1...public if it should be seen by other users. |
| **prj_ task _ id :** | Is the foreign key for the table portaal_ projects_ task. |
| **prj_ type :** | Contains 0 for Austria and 1 for Europe. |
| **prj_ news :** | Contains 1 if the project /product/ application/ service should be shown on the new page or 0 if it should not be shown. |
| **prj_ public :** | Contains 1 if the project /product/ application/ service should be made public for other users or 0 if it should be private. |
| **prj_ author :** | Foreign key to table portaal_ user. Contains the ID of the user which has created the project/ product/ application/ service. |
| **prj_ review_ author :** | Contains the user ID of the user which has reviewed the project/ product/ application/ service. |
| **prj_ last_ update :** | Contains the date of the last update. |

CHAPTER 7

# Conclusion

In this thesis the benefits for the Austrian state in consequence of application of Ambient Assisted Living is discussed. The Austrian care system and its costs, which are borne partially by the person in need of care as well as the state, are reviewed. Most expensive is the change of living arrangements of a person in need of care from being able to stay at home and live a rather independent life into a residential care home for older people. Due to this it is advantageous to postpone this step as long as possible with the help of Ambient Assisted Living.

As the conducted survey shows, this goal is possible through Ambient Assisted Living. According to interviewees, the situation of independent living arrangements could be prolonged for two years. This leads to a calculated saving of about EUR 2.390 per month and person if there were no other previous care forms engaged. Furthermore, obviation of a rise in care level is accompanied by savings for the state in the form of lower nursing allowance costs and less required care hours.

It can be concluded that investments in AAL projects could be beneficial for the Austrian state. Therefore, it should be considered to increase the funding of Ambient Assisted Living.

In addition, different possibilities to finance Ambient Assisted Living projects were identified like government grants or crowd funding. With state grants, Austria's reputation rises globally concerning care for older people and investment in technological advances. Also, indirectly through tax on wages and value added taxes government grants are retrieved.

Furthermore, the concern for a central contact centre about Ambient Assisted Living was inquired. Interest to take part in such a platform was over 80% with interviewees. The gathered information about companies and projects was used to adapt an already existing web application and its database and to submit the data of companies partaking in the survey to the platform if desired.

A description of the web application and its corresponding database can be found in this thesis to enable future enhancements.

APPENDIX A

# Informational papers regarding quality of life

This part of the appendix consists of a list of papers which where used in [FEL1995] to generate the figure regarding domains relevant to quality of life.

**Andrews and Withney (1976):**
Andrews, E M., Withey, S. B. (1976). Social indicators ofweUbeing:
Americans' perceptions of life quality. New York: Penum Press.

**Baker and Intagiliata (1982):**
Baker, E, Intagliata, J. (1982). Quality of life in the evaluation of community support systems. Evaluation and Program Planning, 5, 69-79.

**Bigelow et al. (1991):**
Bigelow, D. A., McFarland, B. H., Olson, M. M. (1991). Quality of life of community mental health program clients: Validating a measure. Community Mental Health Journal, 27, 43-55.

**Blunden (1988):**
Blunden, R. (1988). Quality of life in persons with disabilities: Issues in the development of services. In R. I. Brown (Ed.), Quality of lifefor handicappedpeople (pp. 37-55). London: Croom Helm.

**Borthwick-Duffy et al. (1992):**
Borthwick-Duffy, S. A., Widaman, K. E, Little, T. D., Eyman, R. K. (1992). Foster family care for persons with mental retardation. Washington DC: American Association on Mental Retardation.

**Brown and Bayer (1992):**
Brown, R. I., Bayer, M. B. (1992). Rehabilitation questionnaire manual: A personal guide to the individual's quality of life. Ontario: Captns Press.

**Campbell et al. (1976):**
Campbell, A., Converse, P. E., Rodgers, W. L. (1976). The quality of American life: Perceptions, evaluation and satisfactions. New York: Russell Sage Foundation.

**Cummins (1992):**
Cummins, R. A. (1992). Comprehensive quality of life scale – intellectual disability (3rd ed.). Melbourne: Psychology Research Centre.

**Flanagan (1978):**
Flanagan, J. C. (1978). A research approach to improving our quality of life. American Psychologist, 33, 138-147.

**Franklin, Simmons, Solovitz, Clemons, Miller (1986):**
Franklin, J. L., Simmons, J., Solovitz, B., Clemens, J. R., Miller, G. E (1986). Assessing quality of life of the mentally ill: A three-dimensioual model. Evaluation and the Health Professions, 9, 376-388.

**Heal and Chadsey-Rusch (1985):**
Heal, L. W., Chadsey-Rusch, J. (1985). The Lifestyle Satisfaction Scale (LSS): Assessing individuals' satisfaction with residence, community setting and associated services. Applied Research in Mental Retardation, 6, 475-490.

**O'Brien (1987):**
O'Brien, J. (1987). A guide to life-style planning. In B. Wilcox, G. T. Bellamy (Eds.), The Activities Catalog:
An alternative curriculum for youth and adults with severe disabilities (pp. 175-189). Baltimore: Paul H. Brookes Publishing Co.

**Parmenter (1988):**
Parmenter, T. R. (1988). An analysis of the dimensions of quality of life for people with physical disabilities. In R. I. Brown (Ed.), Quality of life for handicapped people (pp. 7-36). London: Croom Helm.

**Schalock et al. (1990):**
Schalock, R. L., Keith, K. D., Hoffman, K. (1990). Quality of life questionnaire: Standardization manual. Hastings NE: Mid-Nebraska Mental Retardation Services.

**Stark and Goldsbury (1990):**
Stark, J. A., Goldsbury, T. (1990). Quality of life from childhood to adulthood. In R. L. Schalock (Ed.), Quality of life: Perspectives and issues (pp. 71-83). Washington DC: American Association on Mental Retardation.

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