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INSTITUT FÜR  
TECHNIKFOLGEN-  
ABSCHÄTZUNG

**“PARTICIPATORY APPROACHES  
FOR TECHNOLOGY AND  
AUTONOMOUS LIVING”**

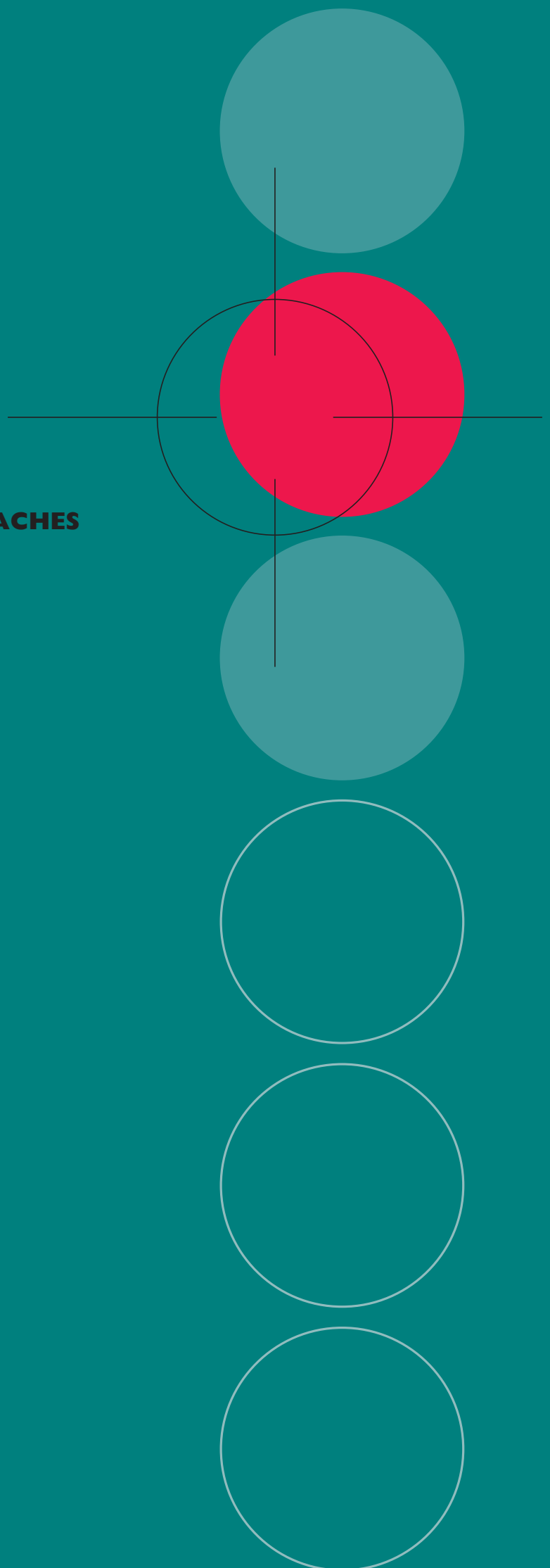
**pTA Aging**

**PROJECT REPORT**

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## **“PARTICIPATORY APPROACHES FOR TECHNOLOGY AND AUTONOMOUS LIVING“**

**pTA Aging**

**PROJECT REPORT**

INSTITUTE OF TECHNOLOGY ASSESSMENT  
AUSTRIAN ACADEMY OF SCIENCES

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# Zusammenfassung

Die Studie „Partizipative Verfahren zum Thema Technologie und Autonomes Altern“ (kurz: pTA Altern), die von Dezember 2007 bis Mai 2008 am Institut für Technikfolgen-Abschätzung durchgeführt wurde, erarbeitete Informationen für die Gestaltung des nationalen Technologieforschungs- und Entwicklungsprogramm *benefit*. Das Programm *benefit* läuft voraussichtlich bis 2015 und ist in die europäische Ambient Assisted Living (AAL) Initiative eingebettet. Auftraggeberin ist die Österreichische Forschungsförderungsgesellschaft (FFG), die auch das Programmmanagement für *benefit* inne hat. Programmeigentümer ist das österreichische Bundesministerium für Verkehr, Innovation und Technologie (BMVIT).

Hauptziel des Programms *benefit* ist es, Technologien und Dienstleistungen zu fördern und zu entwickeln, die es älteren Menschen erlauben, länger selbstständig zu leben. Damit verbunden sollen Autonomie, gesellschaftliche Teilhabe und Lebensqualität gesichert und erhöht werden. Da es sich bei *benefit* um ein marktnahes Forschungs- und Entwicklungsprogramm handelt, kommt es zwangsläufig zu einer starken Fokussierung auf ökonomische Zusammenhänge. Technikfolgenabschätzung stellt hier sicher, dass andere gesellschaftlich relevante Bereiche nicht vernachlässigt werden, und der erweiterte gesellschaftliche, soziale und kulturelle Kontext berücksichtigt wird. Diese Anforderung geht von autonomem und aktivem Altern als nachhaltigkeitsrelevantes Thema aus, in das u. a. Aspekte der langfristigen Planung, der Gerechtigkeit und der Selbstbestimmung hineinwirken und in welchem sozio-ökonomische Dimensionen mit technischer Effizienz in ein fallweise widersprüchliches Verhältnis treten können.

Bei pTA Altern handelt es sich um eine explorative Studie, deren vorrangiges Ziel es war, „Akteure der Praxis“ zu Wort kommen zu lassen. „Akteure und ExpertInnen der Praxis“ waren Betroffene, potentielle NutzereInnen und Gesundheits- und SozialdienstleisterInnen ebenso wie TechnologieentwicklerInnen, die in ihrem (beruflichen) Alltag mit dem Thema (umgebungsgestütztes) Älterwerden zu tun haben und so verschiedene lebensweltliche Perspektiven einbringen konnten.

Ziel von pTA Altern war es, für das Programm *benefit* jene Themenbereiche zu identifizieren, in denen Partizipation zur Begleitung bzw. als Bestandteil der Forschungs- und Entwicklungsarbeiten sinnvoll und notwendig ist. Darüber hinaus ging es um die Frage, welche relevanten Gruppen in solche Prozesse eingebunden werden sollen. Die Identifikation möglicher Problembereiche, die für das Programm relevant werden könnten, bildete ein weiteres Ziel.

Um die ExpertInnen und Akteure der Praxis zu identifizieren wurde zu Beginn eine Literaturrecherche durchgeführt. In fünf Gruppeninterviews diskutierten 26 Personen die Kernfragen des Projekts. Dabei standen der Tagesablauf älterer Menschen und jene Bereiche im Vordergrund, in welchen Probleme auftauchen und unterstützende Technologien in Anspruch genommen werden, oder nicht. Die Wahl des Begriffs der unterstützenden Technologien unterstrich gleichzeitig den problemorientierten Ansatz und erlaubte eine breite Diskussion, da hierunter alle Arten von Technologien verstanden wurden (einzelne mechanisch Hilfsmittel ebenso wie integrierte Systeme wie etwa „smart houses“).

Sieben ExpertInneninterviews aus Bereichen wie Gerontologie, Psychologie, Soziologie, KonsumentInnenschutz und Pflegewissenschaften sollten den Blickwinkel auf einzelne Fragen erweitern. Um mögliche Fallstricke für die

## Hintergrund

## Die Rolle der Technikfolgenabschätzung

## Ziele

## Methode

Technologieforschung und Entwicklung frühzeitig zu identifizieren, wurden im Rahmen einer Sekundäranalyse sieben Projekte mit partizipativen Ansätzen auf europäischer Ebene analysiert.

### **Ergebnisse**

Auf Basis der Gruppeninterviews konnte der Kontext für Technologieentwicklung definiert werden. Dieser besteht aus relevanten Aktivitätsbereichen älterer Menschen wie Leben zu Hause, Mobilität, Freizeit und Erholung sowie arbeitende Tätigkeiten. Die Aktivitätsfelder werden außerdem von Determinanten wie Information, Lernen, Kommunikation, Gesundheit etc. beeinflusst.

Wichtige Akteure sowohl als InformantInnen für das Programm, als auch als auf Projektebene einzubindende „ExpertInnen der Praxis“ und mögliche zukünftige FörderwerberInnen sind beispielsweise Gesundheits- und SozialdienstleisterInnen, Familie etc., wobei der unmittelbaren sozialen Umgebung älterer Menschen besondere Bedeutung zukommt.

Die Ergebnisse, die das Zusammenwirken von unterstützenden Technologien und autonomer Lebensführung behandeln, beziehen sich auf:

- Abwägungen (trade-offs) in Bezug auf Nutzen und Risiken von unterstützenden Technologien;
- Relevante Bedingungen für Forschung und Entwicklung (F&E) sowie F&E-Politik und Regulierung;
- Arten der NutzerInnenintegration und Bedingungen für partizipative Prozesse;
- Individuelle Verhaltensmuster älterer Menschen, die im Kontext unterstützender Technologien bedeutend sind.

Im Zuge des gesamten Prozesses wurde der Kommunikation besondere Bedeutung zugemessen, um in Forschung und Entwicklung von unterstützenden Technologien auf die Bedürfnisse der NutzerInnen eingehen zu können und diese so zu gestalten, dass sie leicht bedient werden können. Dabei lassen sich Methoden, die NutzerInnen zu Testzwecken während der Produktentwicklung integrieren, von solchen unterscheiden, bei denen verschiedene Beteiligte (nicht nur NutzerInnen) den F&E Prozess tatsächlich mitgestalten können bzw. wo ForscherInnen unter bestimmten Bedingungen in das Leben der NutzerInnen integriert werden. Hier wurde der Mehrwert in der Möglichkeit gesehen, dass das Verständnis und Kennenlernen des Lebens älterer Menschen ein Meilenstein in der Entwicklung von Technologien für diese sein könnte.

### **Empfehlungen**

Auf Basis aller Ergebnisse wurden Empfehlungen formuliert, die sich auf das Programm und auf die Projekte beziehen. Es wurden auch einige Empfehlungen formuliert, die im Programm längerfristig verankert werden können.

Es geht auf Programmebene etwa um die Koordination von nationalen und internationalen Programmen, um spezifische Kommunikationsstrategien, um die Betonung problemorientierter Forschung oder um die Berücksichtigung und Abwägung vielfältiger Bedürfnisse. Diese können sich fallweise auch widersprechen. In Bezug auf Projekte werden u. a. ethische Standards, der Einsatz klarer Begriffe, und die Berücksichtigung der sozialen Umwelt von NutzerInnen gefordert.

Für einen gerechten Zugang soll bereits rechtzeitig auf Programm- bzw. auf Projektebene die Leistbarkeit von Produkten und Dienstleistungen für alle sowie Verbesserungen der (öffentlichen) Infrastruktur berücksichtigt werden.



## Summary

The project “Participative approaches for technology and autonomous living“ (short: pTA Aging) conducted at the Institute of Technology Assessment mainly aimed to provide bottom-up generated information for the national R&D programme *benefit* and was commissioned by the Austrian Research Promotion Agency (FFG) which is responsible for the programme management. The owner of the programme is the Austrian Federal Ministry for Transport, Innovation and Technology (BMVIT).

The Austrian national R&D programme *benefit* which is embedded within the European Article 169-Initiative AAL (Ambient Assisted Living) aims to stimulate research and development of technologies for autonomous aging. Of particular importance is the attempt to provide information and communication technologies (ICT) which enable older adults to raise their quality of life, and to ensure their ability to actively participate in social life.

The programme *benefit* adheres to a mission-oriented approach and aims to contribute to tackling a societal problem. As an R&D programme it is closely connected to the market. Therefore, economic factors come to the fore, which bears a certain risk of ignoring the general context, such as social, cultural or other relevant factors. It is a core element of Technology Assessment (TA) to shed light on this very context.

To properly outline the scope of the study at hand two conditions have to be mentioned here.

Firstly, this study has applied an explorative mode of research. Although a literature survey was conducted, the aim was not to illustrate the scientific state-of-the-art of the debate on AAL but to shed light on perceptions of selected “experts from practice” and to identify essential aspects of the context to be considered by such a programme. In other words, we did not try to interpret the outcomes in terms of different available theories of aging but to identify critical questions which should be considered in the context of AAL.

Secondly, this study is one amongst others that were conducted simultaneously on behalf of the commissioning institution and the BMVIT. Therefore it was a conscious decision to include mainly those actors in the project pTA Aging who were not already involved in other programme activities to broaden the scope. This implies that the results of the report at hand do not cover the current professional landscape in its entirety in this area in terms of persons or debates in Austria.

The study aims to identify important actor groups and the relevant topics according to their perceptions. Thereby a focus was put on the identification of topics which define the social and organisational context of innovative technical solutions for autonomous living of older adults. In the context of the study also potential pitfalls that should be prevented in the course of the programme were identified.

An initial literature survey served to develop guidelines for group interviews and helped to identify key actor groups who could provide different insights and experiences on the needs of older adults for aging well. The key question to initiate a dialogue with the interviewees (mainly potential users, social and health care providers, researchers and technology developers, but also political authorities or journalists ) was:

*In which context do older adults use or not use assistive technologies (ATs) in their daily lives?*

### Background

### Scope

### Aims

### Method

To allow a broad discussion on potential needs and problems and facilitate communication with different actors the term ATs was used as representative for all AAL relevant technologies (single devices or integrated systems, mechanical or electronic etc.).

The results generated in the group interviews were supplemented by the results of seven expert interviews from a broad spectrum of disciplines (psychology, sociology, gerontology, medicine and care sciences, social work, education, and consumer policy).

A secondary analysis on seven international projects with a strong link to participative approaches for developing ATs for older adults provided an additional source of information.

Single aspects of the results we found were finally supplemented with examples selected from the literature whereby we emphasise the exemplary character of the references used here to illustrate the results and not to display a comprehensive analysis of the work conducted in these fields.

#### **Types of results**

The group interviews provided the main basis for generating the results in terms of:

- Relevant activity fields of older adults (living at home, mobility, leisure time or recreation and work) and important determinants for these (such as information, learning, communication and interaction, health etc.) were identified as a highly interconnected frame of reference to locate needs and problems that can potentially be addressed by ATs.
- Important actors who relate to autonomous living of older adults such as family, health care and care providers etc. and are relevant for *benefit* (both, as informants from practice and as applicants).
- Individual patterns of behaviour and attitudes which are relevant to the context of autonomous living.

The question of the interaction between ATs and autonomous living provided insights in terms of:

- Trade-offs between potential benefits and risks of ATs;
- Relevant conditions for R&D;
- Policy and regulation;
- Modes of user integration and conditions for participatory approaches.

#### **Results: Participatory strategies are promising ...**

All findings indicate that participative strategies seem promising to clarify the requirements and conditions to be met and to consider social needs and users' perspectives and shape technologies at a very early phase of the technological development at all stages of a potential project.

#### **... and not equal to market research**

Nevertheless, participatory activities – involved actors have a say in the process – have to be distinguished from other user integration strategies such as product testing or interviews for market analysis. Participatory approaches are promising options to generate insights that allow dealing with complex socio-economic interactions, multiple values, controversial interests and needs and the heterogeneity of actors all of which are characteristic of AAL. However one important precondition for successfully integrate different actors into R&D of AT is the valuation of these activities by the researchers and technology developers who are involved.

#### **“technology versus human support”**

Several trade-offs in terms of ATs were identified in this project whereby one of the most important areas here seems to be the ambivalent meaning of AT in the context of care. It was considered important that the human support and interactions were not replaced by ATs to avoid social isolation. Furthermore,

possible contribution of ATs to “total control” and “total bureaucracy” and a decrease in organisational flexibility was seen as critical.

To mention another critical issue, the often perceived trade-off between more security and less privacy was discussed, wherein the frequent differentiation between “real security” and “perceived security” merits mention. As a clearer result the identified danger of abuse of generated data should be noted.

**“control  
versus security”**

In this context, it seems important to monitor the ambivalence of depicting older adults either as mature customers who clearly know what they want or do not want or as customers who are unable to orient themselves within an abundant market of ATs – to mention only the polarities. Therefore regulations for privacy enhancing approaches are required along with the consumer-friendly information on ATs, which can be fully understood.

Considering the results of this study it seems important to shed light on peculiarities of the potential market of ATs. The way older adults are addressed by the market needs careful consideration and the surroundings of older adults (including social, psychological and physical factors) need to be addressed.

**Peculiarities of  
the market**

Furthermore, functional schemes that reinforce stereotypes e.g. in terms of capabilities or incapacities have to be investigated critically because they might impair communication between users and developers of ATs. This is especially important as the quality of communication processes between all involved actors for R&D of ATs was emphasised throughout the process.

**Recommendations**

To make the multitude of generated results fruitful for the programme *benefit*, a list of recommendations for the programme and the project level was developed. Moreover underlying and long-term recommendations were identified. Major topics here are information coordination, social inclusion, communication, long-term perspectives, research coordination, ethical standards, shaping of technology, and learning and technology literacy.



# Foreword

In the past, various studies conducted at the Institute of Technology Assessment (ITA) have dealt with the societal needs of the aging population in Austria. The study “Medizintechnik und Lebenshilfen für ältere Menschen” which was prepared in the course of the Austrian Technology Delphi II (ITA 1998) has for instance proposed measures that were considered important for autonomous living of older adults<sup>1</sup>. Autonomous living requires more than mere technological support. The importance of in-time consulting for potential users proved to be of major importance (Wild and Kirschner 1993), as was a concept of home that integrates the surroundings outside the home. Successful models that support autonomous living would require the integration of health and social aspects too and therefore there is a need for concepts to coordinate the different services and goods (Wild and Leitner 1997).

The ITA project “Participative approaches for technology and autonomous living“ (short: pTA Aging) was conducted between December 2007 and May 2008. It was designed to contribute to the national research and development *benefit* programme<sup>2</sup> on autonomous living and serve the commissioning institution, the Austrian Research Promotion Agency<sup>3</sup>, as a source of information in terms of the future adjustment of the programme-direction and the further development of project guidelines. It is also intended to serve as a pool of information on future topics, relevant actors and potential pitfalls to be avoided at both the level of the *benefit* programme and the projects that will be conducted within this national technology research and development programme.

We want to thank those without whose contribution this project could not have been conducted: all the participants in the group interviews and the experts who were willing to share their experiences and spent their time discussing with us. Insights drawn from these discussions contributed to the development of the recommendations as formulated in this report.

Roman Winkler contributed valuable comments especially in the initial phase of the project for which we want thank him.

The project also benefited from an external review on the secondary analysis that was performed by Ida Elisabeth Andersen, an expert at the Danish Board of Technology.

Moreover the commissioning institution supported the project team within regular meetings.

Last but not least we want to thank Julia Haslinger and Philipp Withalm for their supporting activities during their internships at the ITA.

**Background of the project at ITA**

**The research programme benefit is the main addressee of this report**

**Active participation of 33 experts from the fields of theory and practice**

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<sup>1</sup> In the whole project we deployed the term of “older adult” instead of “elderly or elderly people”. As Harwood (2007) suggests this is the most polite and appropriate term, which also indicates that the persons addressed are adults and not part of any other pseudo-homogenous or functional group.

<sup>2</sup> Austrian national research and development programme *benefit*: [www.ffg.at/content.php?cid=743](http://www.ffg.at/content.php?cid=743) benefit.

<sup>3</sup> Österreichische Forschungsförderungsgesellschaft (FFG).



# I Introduction

Against the background of increasing lifespan in Europe and the perspective that the group of older adults will grow constantly over the coming decades, it is evident that society needs to actively tackle various resulting areas of concern (e.g. Vincent et al. 2006; COM 2005; Bomsdorf 2005; Tremmel 2000). Public authorities also address these issues by boosting the research and development of technology for autonomous aging (COM 2007a,b), as exemplified by the Austrian national research and development *benefit* programme, which is embedded within the European Article 169 Initiative Ambient Assisted Living (AAL). Of particular importance is the attempt to provide ATs that allow older adults to increase their quality of life and ensure their ability to actively participate in social life (see also Jarré 2008).

The design and application of ATs is, within the normative framework of sustainable development, a part of the activities (e.g. social and organisational innovations) which are necessary to deal with the issue of aging well. Technical innovations are in this case not regarded as solutions to problems, since aging well has to be addressed by socio-economic, cultural and socio-political measures. Against the normative background of sustainable development, one of the key activities (to identify the needs, define the targets and develop measures e.g. in the context of ATs) is the exchange of people affected in different ways in discussions with decision-makers. This participatory approach has a central role in the concept of sustainable development and is applied in the context of issues that affect wider parts of society (see also Nentwich et al. 2006, Bäckstrand 2003).

As participation (on the level of the *benefit* programme and the corresponding R&D projects) is considered an important precondition for providing adequate technologies, this project has tried to identify the conditions that must be met in accordance with social needs and users' perspectives in terms of technical solutions that facilitate autonomous living. To achieve this objective, it is important to know what areas of life may be affected by ATs and who should be involved at what stage of the research and (product) development process.

Chapter 2 of this report sheds light on the aims of the project in more detail and also sets out some underlying assumptions and terminological aspects. Chapter 3 is dedicated to clarifying the methodological approach including group interviews, expert interviews and a secondary analysis of a number of projects on participative approaches. Chapter 4 contains a discussion of the results presented and the most important lessons learned. Chapter 5 summarises these insights in the form of practical recommendations.

**Austrian and European background of the pTA Aging project**

**Participatory activities are a substantial element in sustainable development**

**Structure of the report**





## 2 Project aims, assumptions, terminology

The pTA Aging project aimed at identifying

- areas of interest for potential future topics to be tackled by AAL technologies,
  - topics possibly to be addressed in the *benefit* programme that require the participatory inclusion of citizens, potential users or stakeholders;
- the relevant groups in terms of key players, stakeholders and (end-) users, and
  - those who need to be involved at programme level and the modes in which this can possibly happen;
- the success factors that help to prevent potential pitfalls in the course of developing ATs and here especially considering participatory approaches.

**Relevant actors, themes and success factors for developing ATs**

This report presents results and insights with respect to these three aims. They serve as a basis for formulating policy recommendations. The project aims to contribute relevant insights in terms of a critical approach to ATs and their use.

A general question from the TA-perspective in this context is:

- Do the technological appliances and systems for AAL developed by the technical disciplines meet the needs of older adults (senior citizens)?

**Critical questions**

To answer this question we should know:

- What should AAL services comprise?
- Who are the actors involved in developing, implementing, and applying AAL technologies and services?
- What are potential impacts of technical solutions for individual users and for society?

These are all-embracing questions which by far exceed the scope of this study. Nevertheless, they provided the starting point for designing the research method of pTA Aging.

The project therefore is supposed to identify the requirements and conditions which must be met in accordance with social needs and users' perspectives on technology and autonomous living. Necessarily this effort raises controversial issues such as when and to what degree AT supports individuals and when it starts to paternalize older adults (for societal controversies on the US-American debate see also Moody, 2006, Ogozalek 1991).

**Dialogue with actors to identify controversial issues in the context of ATs**

One way of revealing potential controversies is seen in a dialogue with potential users of ATs as sought in this project.

In order not to predetermine the outcomes, within the group and expert interviews we approached the topic of ATs indirectly, for instance by asking what is important in the lives of older adults, what their lives are like, and who is important in their lives. Another important issue was the topic of how the information transfer between the hypothetical "technology developer" and the "user" should be designed. More concrete aspects of participation and the corresponding pitfalls were gathered from a secondary analysis, which examined projects already conducted in terms of their strengths and weaknesses. Therefore we did not confront the interviewees with questions on potential failure sources, but we asked for their comments on challenges for the information exchange between relevant actors.

**Knowing what the lives of older adults are like before discussing ATs**

The policy recommendations (as summarised in Chapter 5) are based on the synthesised outcomes of the project.

The following sections explain the concept of Ambient Assisted Living (AAL) and identify the relevant surroundings of the older adults as deployed by the joint Programme AAL. In terms of the actors we reflect here the state of the art as used in the ICT for Elderly Action Plan (COM 2007a), and we set out in brief the persons we addressed during the project as actors.

## 2.1 Ambient Assisted Living

**Independent living, autonomy, assistance, access and individuality as core terms of AAL**

Ambient Assisted Living (AAL) aims to “*foster the emergence of innovative ICT-based products, services and systems for ageing well at home, in the community, and at work, thus increasing the quality of life, autonomy, participation in social life, skills and employability of elderly people, and reducing the costs of health and social care; Create critical mass of research, development and innovation at EU level in technologies and services for ageing well in the information society, [...] Improve conditions for industrial exploitation [...].*” (COM 2007c: 2)<sup>4</sup>. The Austrian national research and development benefit programme is embedded within the European Article 169 Initiative AAL<sup>5</sup>.

## 2.2 Technologies for Ambient Assisted Living

**Home-based electronic devices in general and devices to facilitate ICT use**

Ambient Assisted Living is based on ICT technologies such as ATs which were at the core of this study. Following Doughty et al. (2007) we distinguish between ATs as mechanical devices (e.g. stair lift or elevator, grab rails or ramps) and electronic systems (smart home systems or electronic door locks) and fixed devices as opposed to portable devices. The extent to which the potential user is aware of these technologies may also vary from visible to fully integrated or manual to fully automated. In the pTA Aging project we focused on home-based electronic systems and included devices to facilitate ICT use for older adults in general as opposed to a focus on medical institutions (again following a distinction by Doughty et al. 2007).

## 2.3 Surroundings of older adults

The Commission Staff introduces three areas of challenges important to independent living (COM 2007a: 16-17) and emphasises that measures tackling the digital divide are important.

<sup>4</sup> The Commission Staff Working Paper “Ageing well in the Information Society” (COM 2007a: 63) also refers to AAL.

<sup>5</sup> European Article 169-Initiative AAL: [www.aal-europe.eu/](http://www.aal-europe.eu/).

Active Aging at work: “[...] ICT is expected to support the provision of reliable health care and social care in the home,

Social participation: “[...] ICT solutions are expected to help to retain and improve the knowledge and skills”;

Avoiding digital divide: “[...] Given the pace of development and the different technological waves in the ICTs, there are strong reasons to believe that cumulative digital divides will persist and risk to become a permanent phenomenon if no counter-measures are taken, thus translating into social stratification. ICT-enabled services need to meet access, accessibility, affordability, and usability requirements. If they do so, they can much facilitate active engagement in social interaction for the aging population”.

Figure 2.3-1 illustrates AAL and the surroundings of the “well being person” (older adult) as conceptualised in the AAL Joint Programme.

**Reducing the digital divide shall improve social participation and skills of the aging population**

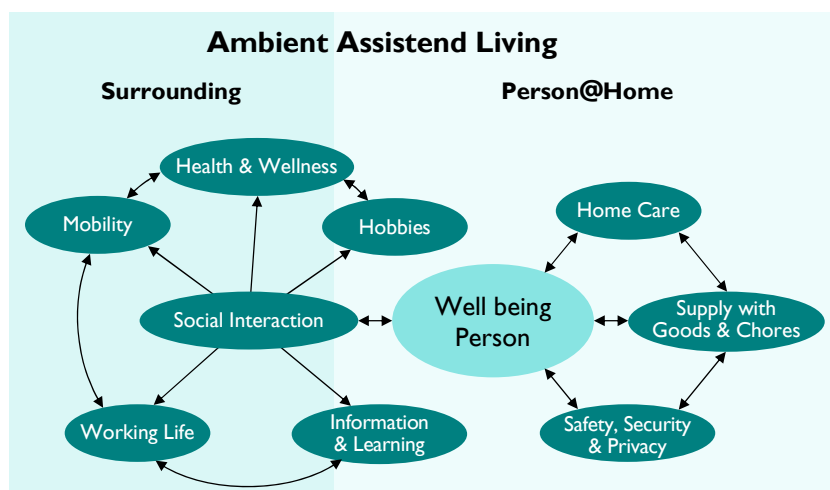


Figure 2.3-1: Important surroundings of older adults/well being persons according to the AAL Joint Programme.

Source: COM 2007a: 65

The AAL Joint Programme takes into account the entire environment (at home, on the move) and connects it to work life, recreation etc. Our findings suggest a slightly different classification for the surroundings of older adults which is presented in Chapter 4. A person experiencing well-being (the “well-being person”) is presumed to be active:

- at home (independent living);
- at work (either working or continuing activities from active working life or other regular activities with work character);
- pursues leisure and recreational activities;
- and is on the move (in-house and out-house mobility).

**Mobility, work life, leisure time, and the own living space as surroundings**

## 2.4 Well-being Person

**Well-being embraces physical, social and cognitive aspects – it reflects a positive attitude towards life**

**Integrating different actors and perspectives to address well-being**

The term well-being person is used in AAL documents to describe someone who is deliberately paying attention to his/her well-being. Risks to personal well-being are identified as physical and cognitive impairment.

The concept of the “well-being person” therefore assumes that a person is well integrated in society, well informed and able to cope with the challenges of aging. Furthermore, such individuals are highly autonomous, well accommodated, in good health and have access to social and healthcare if needed (based on COM 2007a). Overall, it reflects a positive attitude towards life, which is all the more important considering that recent studies suggest that aging is largely perceived as negative in Western societies and that older adults have increasingly faced discrimination in recent years (Harwood 2007).

There are frameworks that conceptualise well-being (e.g. Fry 2000; Ryff and Keyes 1995, Fisher 1995) with indicators such as social interaction, purpose of life, self acceptance, personal growth, environmental mastery, and autonomy being identified as being critical and even gaining in importance, as Baltes (2006) states. We also emphasise that well-being and the indicators mentioned here contain highly subjective valuations. The different characteristics of these issues may illustrate how different the contents are that are at stake here. Therefore the approaches chosen should be inter- and trans-disciplinary, especially as the topic of aging itself and the discipline of gerontology are intersecting different disciplines (see also Simon 2004). In this research project the participants were selected so as to address this aspect.

## 2.5 Actors

The key actors who develop, carry out or are affected by a policy aimed at stimulating the ICT market for older people are according to the Commission Staff working paper (COM 2007a: 48-49) categorized in seven heterogeneous groups:

1. “Older persons *should be involved from the beginning, to take on board user needs, and to be involved in testing and evaluation, and to make their voice heard in vision and policy development.*”
2. Ministries and public authorities *at national and regional level responsible for policy, legal and implementation frameworks with policy responsibilities for finance, competitiveness, innovation, social affairs, health, housing, labour, education.*
3. Industry and service providers, *industry associations, chamber of commerce, professionals and their professional associations (product development, deployment, take-up). ICT, professional social services, health, training, pharmaceuticals should all play a role.*
4. Employers, *to address the issues of active ageing at work.*
5. *Public and private health insurers whose cost reduction concerns will need to be addressed by any policy initiative on ageing.*
6. Researchers and academia *looking into innovative and creative solutions also provide scientific support to these actions.*
7. *Telecom and building infrastructure regulators and standardisation bodies: organisations are key enablers of the products and services availability.”*

In the EU concept, the delivery chain for independent living is seen as starting with the ICT industry (ATs, group 3 in the list of key actors), which provides information and products to authorities (group 2), insurance companies (group 5), formal service providers (group 3, organisations, health, building ...) and informal service providers (older adults, family, community ...)<sup>6</sup>. These groups communicate with professionals (group 3, social, health care) who are in direct contact with old users (group 1) (see COM 2007a: 19). The informal service providers are mentioned in this concept, but they are not included in the table of key actors in (COM 2007a: 19), nor are the semi-formal non-governmental organisations (NGOs) that conduct self-help initiatives.

The delivery chain scheme for aging well at work includes the ICT industry (group 3), which communicates with employers (group 4) who are in direct contact with older members of staff (group 1). According to this concept, providers (group 3, training) support such individuals in acquiring skills.

In terms of social participation and aging, the ICT industry (group 3) communicates with informal networks that influence the decisions of older people (group 1). Trainers (group 3) have a supporting role (COM 2007a: 20).

Within the pTA Aging project we addressed institutional service providers (health & social care) and informal service providers (family and community) as “users” in addition to the individual users and representatives of citizen groups, because they too apply ATs, thus acting as multipliers.

As “users” we regarded not only older adults (who are actually advanced in age and may display sensory, motor, cognitive, or auditory functional impairment) but also persons who are in direct contact with older adults, who are customers of products for older adults or who provide diverse services for them.

We also addressed actors in research, academia, industry, as well as public authorities and actors whose profession is rooted in communication (e.g. trainers, journalists, consultants etc.).

**The EU concept of actors relevant to the ICT market frames family, communities and NGOs merely as information receivers ...**

**... but a bottom up approach includes social assemblies like families, communities and NGOs as actors**

Table 2.5-1: Scheme of relevant actors for pTA Aging.

Actor groups – general level	Specification
Social and health care (multipliers and users)	Social services providers Health services providers
Potential Users (multipliers and users)	Representatives of citizen groups (NGO's, NPO's, clubs, associations etc.) Users in terms of individuals (older adults, their families, and communities)
Researchers and academia	R&D institutes, scientific institutes
Industry and service providers	Hospitals Industry, small and medium enterprises
Ministries and public authorities	Local policies and government National policies and government
Communicators and content generators	Education, Consultants, Media

<sup>6</sup> The service providers are specified in the delivery chain for independent living (COM 2007a: 18-19).

In accordance with the commissioning institution, this study focused on potential users and social and health care providers as the primary target group. Additionally, representatives of all groups mentioned in Table 2.5-1 were involved and also participated, as Table 3.1-1 (section 3.1) indicates. Employers, public and private health insurance companies, telecoms and building infrastructure regulators and standardisation bodies (as groups 4, 5 and 7 of the list in COM (2007a: 49) were not addressed within this project.

### 3 Project design and method

To approach the challenging topic from the point of view of “practicing experts” following a desk research, a customised approach was designed making use of three different information sources:

1. Five exploratory group interviews were held to include opinions of different users and intermediary persons on potential future topics, especially potential barriers to the actual adoption of technology. The different compositions of the group interviews served to integrate different perspectives. This allowed the pool of relevant future issues for Ambient Assisted Living to be widened.
2. Seven experts in different fields such as gerontology, psychology, sociology etc. were interviewed to serve as a complementary information source to the users’, technology developers’ and other actors’ points of view. The relevant actors were identified through desktop research and co-nomination.
3. A secondary analysis of previous experiences with participatory approaches for aging issues was performed to identify potential pitfalls for such approaches.

A list of the participants of the group interviews (Table A-1), and of the experts who were interviewed (Table A-2) are provided in the Appendix.

***The research questions were addressed in interviews and by analysis of relevant projects***

#### 3.1 Group interviews

To identify the user needs and problems, the specific surroundings, the relationship between aging and technology and the information exchange between technology developer and user we posed the following questions:

- What is important to older adults in the course of their daily lives?
- Where do problems appear?
- What are the surroundings of older adults?
- What role do technological devices play?
- How do older adults gather information about technological devices?
- How can technology R&D learn about the needs of older adults?

To find answers to these questions, five explorative group interviews were held with 26 participants who had been contacted by the pTA team (January 2007 to March 2007). During the first phase of the project (December 2007 to January 2007) actors were identified (see Table 2.5-1) and contacted by the pTA Aging team – to inquire whether they would like to participate or send someone to participate in the group interviews a brief description of the purpose was provided. For the organisation of each group interview we contacted a balanced number of different potential participants. In total, approximately 400 relevant persons, institutions, societies, university departments, institutes, enterprises and companies were contacted.

***26 participants of group interviews shared their experiences on aging and technology***

Each group meeting consisted of three to eight participants who all had different backgrounds as indicated in Table 3.1-1. For instance, one of the interviews was conducted in a small town outside Vienna with women participation only. The different compositions were intended to allow tracking differ-

ent perspectives so as to widen the pool of relevant future issues for Ambient Assisted Living. According to the backgrounds, the fine-tuning of the questions was varied slightly to make sure that in each of the group meetings the participants were confronted with contents in ways that they would want to talk about a certain topic without being compromised.

Table 3.1-1: Participants of all identified general actor groups that attended the group interviews of the project pTA Aging.

ACTORS Place, date 2008	Social & health care	Potential Users	Researchers & academia, Industry & service providers	Ministries & public authorities	Communication & content generation
ITA: 28.1.	X	X	X		
NÖ: 7.2.	X	X		X	
ÖAW: 19.2.	X	X	X		X
ITA: 20.2.	X	X	X	X	X
ITA: 6.3.		X	X	X	X

ITA: Institute of Technology Assessment, Vienna; ÖAW: Central building of Austrian Academy of Sciences, Vienna; NÖ: Neulengbach in Lower Austria (Niederösterreich)

**A guided structure  
provided a frame but  
allowed different  
arguments**

The group interviews lasted approximately 2.5 hours, and each comprised a short introduction on technology assessment, the pTA Aging project and its background in terms of the international and national programme activities at AAL. The method is similar to focus groups but unlike the latter a standardised pre-information on relevant technologies was not provided in advance, because it was important that the persons invited should contribute from their own points of view, and share their experiences and knowledge as “practicing experts”.

After a short presentation of the participants the interview started with an open discussion co-moderated by two persons. The moderation did not interfere with contents. It was also the role of the facilitators to ensure that everyone had the opportunity to comment on each issue and that individual participants would not monopolise the discussion. All interviews were recorded (and transcribed in parts) and the facilitators also took notes on the arguments presented.

## 3.2 Expert interviews

**Different experts  
provided additional  
insights**

Seven experts from the different fields of education, social work, gerontology and nursing, the psychology and sociology of aging as well as consumer policy were interviewed separately to contribute their expertise and their views on the needs of older adults. Their opinions were used as complementary information to the group interviews. The interviews (conducted between February and April 2008) lasted on average between 45 and 80 minutes. The interviews were recorded and transcribed. Two of them were conducted via telephone. The experts were identified through desktop research, co-nomination and recommendations by actors contacted.

The questions they were asked concerned:

- Needs and problems of older adults



- (Potential) turning points in the life course
- Surroundings of older adults
- Estimated future situation and trends
- Technology aging: challenges, problems, potentials
- Actual and ideal interaction and information exchange between user and technology developer.

The situation for aging research in Europe was addressed only by the two experts from the German Centre of Gerontology. Societal aspects of aging, the relationship of technology and aging in terms of theories of aging as well as psychological aspects of aging were thematised here. The expert from the Institute for Education at the University of Graz from the field of interdisciplinary gerontology highlighted educational reflection of technology and aging. The expert from the Institute for Applied Social Work at the University of Applied Science, Vienna also highlighted the relations between social work and aging. Medical aspects of aging, the potential use of technology after hospitalisation and in care-taking situations were reflected by the experts from the Institute of Nursing Science of the University of Vienna and the Christian Doppler Clinic Salzburg (Geriatrics).

The questions above and some additional insights on products for older adults, the market situation and customers and consumers satisfaction were provided by an expert on consumer policy from the Austrian Federal Chamber of Labour, who is also affiliated with the Vienna University of Economics and Business Administration and the Institute of Technology and Sustainable Management.

Initially we developed a pool of questions for both approaches, the group interviews and the expert interviews, and one test interview was conducted for each group to validate these questions. For the group interviews an older adult living alone at home was interviewed, and, for the expert interviews, it was a physician who is dedicated to the topic of aging. In both cases the questions had to be adapted from rather theoretical to practical aspects and it seemed more appropriate to actually discuss the needs and problems in terms of concrete everyday life than to ask questions on the concept of aging, potential technology fields or on potentially negative or positive impacts of technology that we had previously identified (based upon the preliminary analysis of the actual debate).

***Test interviews caused a shift towards practical aspects***

### 3.3 Secondary analysis

**Identify potential pitfalls  
for participatory  
activities**

In order to identify success factors that help to prevent potential pitfalls in respect of the development of ATs, a secondary analysis of existing experiences with participatory approaches for aging issues was performed.

The aim was to identify relevant recommendations for the Austrian R&D *benefit* programme and for the projects that will be conducted within this programme. We studied seven projects with different scopes in terms of their participatory approaches. The selection of the projects was realised according to the content (they all relate to Ambient Assisted Living for older adults) and according to their origin and funding (projects performed by members of the European Parliamentary Technology Assessment EPTA network and EU-funded projects).

This analysis was an exploratory investigation to show examples for participatory approaches in (relevant) Ambient Assisted Living projects in Europe. We did not aim to compare the different projects in terms of their participatory capacity because the design and fine-tuning of participatory processes requires an adaptation to the research question at issue – and hence may become very specific (see Rowe & Frewer, 2004); because the research contexts (taken into account) are highly variable; and because the amount of accessible information is variable in terms of the amount and the depth of information.

For these reasons, we analysed the projects in terms of what questions they addressed, by which participatory method and what can be learned of the chosen approaches. The secondary analysis was conducted to identify relevant challenges for participation in the field of Ambient Assisted Living and thus inputs to avoid pitfalls for the programme (and the future projects). The list of projects is provided in the Appendix in Table A-4.

## 4 Results

This study was aimed at analysing the issue of Assisted Technologies (ATs) for the autonomous living of older adults in order to identify requirements for the successful R&D of ATs and in the field of AAL.

Based on the results of group interviews, expert interviews and the secondary analysis, this chapter specifies the context of autonomous living through:

- Relevant activity fields of older adults and relevant needs in their daily life, which should be addressed by autonomous living (4.1)
- Important actors that influence the autonomous living of older adults (4.2)
- Behaviour patterns of users as a context for autonomous living (4.3)
- Trade-offs between benefits and risks of ATs (4.4)
- Relevant conditions for R&D (4.5)
- Policy and regulation (4.6)
- Participatory approaches (4.7).

In the last section a summary of the results and the obvious success factors are presented in the form of lessons to be drawn. These lessons are illustrated with corresponding exemplary references, which are the result of a literature survey conducted in the course of the project.

### 4.1 *Relevant activity fields of older adults and basic needs*

An important result may be related to the wish for ATs not to be an end in itself but always to rely on the needs of the target group. To analyse these needs and based on the project results, we framed the areas relevant to the lives of older adults as being the overlapping components of working, independent living at home, recreation and mobility.

As presented in Figure 2.3-1 these areas of activities overlap and are influenced by a series of determinants, which again have an impact on all activities:

- Health
- Information and learning
- Security, safety and privacy
- Supply with goods and services
- Communication and social interaction.

We found that the areas of activity of a person experiencing well-being are highly interconnected and contain physical, psychological and social factors.

The main part of our results relates to aspects that are relevant to successfully addressing older adults' needs.

In terms of problems and needs, the areas of living at home (here the activities of daily life or ADLs) and mobility seem to be most important. Communication, interaction and learning are considered to be of high importance for autonomous living.

Different issues such as learning, security, health and social care or communication, are according to numerous examples interacting with all of the four fields of activities in Figure 4.1-1. E.g. to successfully implement an AT in a

**Activity areas and determinants are highly overlapping**

person's life a communication process between an informing entity is necessary and the device has to be adequately handled whereby learning plays a crucial role. Depending on the type of device, the help received by the respective AT may be relevant to a person working at home (e.g. reading or writing) or to a person being able to move at home with the help of an assistive device. The experience of a functioning device may enforce perceived autonomy and personal security.

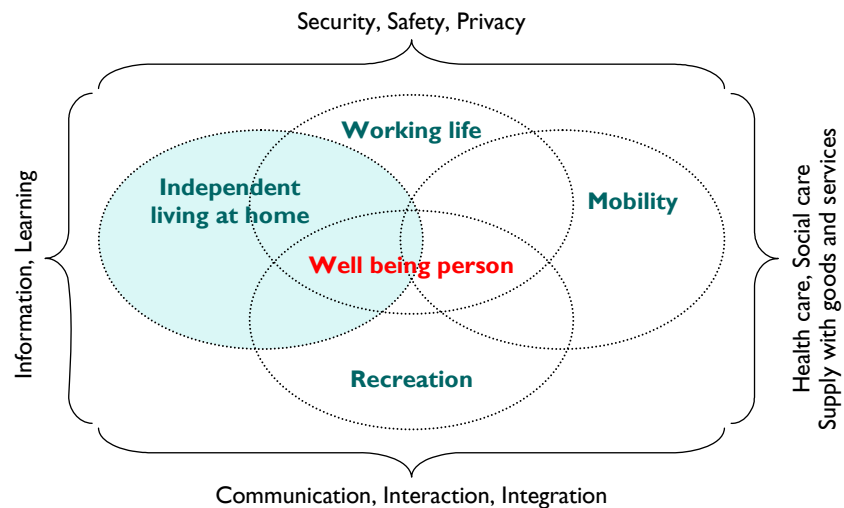


Figure 4.1-1: Activities and corresponding areas in the life of the well-being person and their key determinants.

As a result, we assume that Figure 4.1-1 was a good means to analyse the interviews, but it could not be a good means for a clear categorization of needs. Some interviewees focused on the importance of distinguishing between the real and basic needs of older adults and the demands of the market, which are also regarded as a need.

We identified three types of basic needs or challenges for autonomous living:

- Basic needs to live individually such as
  - Capabilities for ADL (health and social caring services for the daily life such as treatments, nourishment, body care etc.);
  - Mobility;
  - Activities which enforce personal development (some recreation and working life activities);
  - Health and social caring services (e.g. for emergency cases);
  - Having a meaning of life;
  - Not being over- or under-challenged;
- Basic needs to live integrated in society such as:
  - Social contact (trust and communication abilities are necessary);
  - Social inclusion in networks of persons and personal contacts;
  - Social inclusion and hence the ability to access information and infrastructure;
  - Self-confidence;
  - Autonomy;
  - Safety, security, and privacy;

- Activities to avoid boredom;
- Activities which support personal development in social life (recreation and working life activities).
- Societal needs for an aging society in Europe which are influenced by:
  - Cultural, socio-economic and environmental developments in Europe (different forms of living in the family, life planning, different attitudes to aging etc.).
  - Information society (problems: digital divide, bureaucracy, control, coordination of services and information);

All of the areas as sketched in Figure 4.1-1 – as the experts approved – are highly interconnected and should therefore be addressed in their respective context only. In part, interconnections were identified explicitly (e.g. mobility as a condition for social inclusion) and in part they were addressed indirectly (e.g. inclusion as a condition for remaining mobile).

## 4.2 Important actors that influence the autonomous living of older adults

During the interviews a wide range of different actors were suggested as being relevant to the use, the development and the distribution of ATs (see Appendix Table A-3). In an attempt to structure them (based upon the structure used to recruit the participants of the group interviews – see section 2.5) and to provide a clear arrangement, the findings are clustered in Table 4.2-1.

*Table 4.2-1: Relevant actors as identified in pTA Aging for the development, implementation and application of ICT for independent living and well aging*

Aggregated groups	Sub-groups
Individual users	<ul style="list-style-type: none"> <li>● Older adults</li> <li>● Informal social and health service providers (e.g. family, community etc.)</li> </ul>
Organisations	<ul style="list-style-type: none"> <li>● NGOs</li> <li>● Representatives of citizen groups</li> </ul>
Institutional service providers (commercial and non-profit)	<ul style="list-style-type: none"> <li>● Individual institutional social and health service providers</li> <li>● Organisations of social and health service providers. e.g. hospitals, nursing facilities, assisted living residences, continuing care retirement communities, senior-citizen housing facilities, adult day care, home and community-based services</li> <li>● Suppliers of consumer goods (shops, ...)</li> <li>● Transport, infrastructure and security service providers (taxis, banks, home services, fire brigade, ...)</li> <li>● Content providers (education, consultancy, sales people, media)</li> <li>● Aging services providers</li> </ul>
Industry	<ul style="list-style-type: none"> <li>● Large companies</li> <li>● Small and medium enterprises</li> </ul>
Researchers and academia	<ul style="list-style-type: none"> <li>● Universities (interdisciplinary scientific research on aging, ICT, aging and ICT)</li> <li>● R&amp;D institutions</li> </ul>
Ministries and public authorities	<ul style="list-style-type: none"> <li>● Local policy and government</li> <li>● National policy and government</li> </ul>

### 4.3 Behaviour patterns as a context for autonomous living

A number of personal behavioural patterns related to trust, experience, self-perception, the influence of intermediary people and the role of one's aging in society influence the context of autonomous living:

- Trust needs to be considered as a key issue for communication with older people; social care e.g. requires trust between older adults and care-takers.
- Accepting that one is in need of help may be difficult. Often it is unclear what persons need because they do not talk about it.
- The important role of intermediaries such as professionals in the communication with older adults is emphasized.
- The self-perception of older adults may differ from their social perception by other actors.
- One's attitude to aging in society influences the willingness to use ATs.
- The willingness to think about "How can we age in dignity?" in time is important for the use of ATs (toilet, chairs etc.) before the person in question is in a critical situation.
- Older adults may be critical customers as they might have more experience and more questions about the functions and relevant benefits of ATs.
- Abilities and experience based skills of older adults (that might be difficult to see directly) should be regarded. Older adults can e.g. compensate possible physical deficiencies successfully by applying special (experience-based) techniques.
- Personal experiences (bad and good) play a key role in the acceptance of technologies. Technological devices have changed considerably during older adults' lifespan – some technologies are comparably "young" (people remember the initial phase).

### 4.4 Trade-offs between benefits and risks

The use of technologies in everyday situations of older adults as well as in the context of professional care raises contradictory or at least ambivalent issues. These trade-offs, which are not necessarily unsolvable are described here.

#### **Technical versus human support**

*Trade-off between support and social isolation:* Technology was regarded as a support that should not replace human support and contacts or lead to a decline in activities of older adults. Technology was considered to save time for care-takers – this time should not be used to make care more economic or efficient, but should be "earmarked" for social interactions with the persons that are being cared for. This would gain importance if there is a restricted amount of personalised care per month, technological devices could save the care-taker from doing things that keep him/her from talking to the person. Technology could for instance facilitate the operation of windows, blinds or the TV (easy to operate remote control) and might save the nurse from just coming in for such requests.

It was repeatedly emphasised that AT should support, but not replace the need for human care and contact (= basic need). Instead, it should contribute to increase autonomy. Autonomy is not necessarily doing everything by oneself, but is much about having control over what is done (for someone).

*Trade-offs between efficiency and bureaucracy in day-to-day care:* If technology is applied to document patient information, bureaucracy grows and therefore “steals” time. This also leads to a conflicting situation in terms of security and traceability of actions.

- An increasing degree of bureaucracy could be a problem for sound information exchange as it was assumed that much time was lost filling out various forms (consistent control of care providing staff would lead to de-humanised care – see below);
- Automatic systems (especially for supervising the work-process of caretakers prove to have two sides: positive in supporting the personnel and negative in controlling and reducing flexibility and time for social contacts (gossip etc.);

*Trade-offs between efficiency and control in day-to-day care:* Assistive devices are also applied to prevent legal problems (legislation on the necessary intervals of working phases and work interruptions for each profession) and therefore their potential to control someone’s work is high. But at the same time management systems for care-providing services could improve their efficiency.

- A potential loss of trust was feared; a lack of trust between old people and those who should help them would have severe consequences in further collaboration activities;
- The application of (efficiency-) criteria derived from technology to human beings was considered dangerous. As insistent attempts are being made to enforce routines in the social and health care sector that are based on the division of labour etc.;
- Danger of fragmentation of care-taking services and therefore different service providers according to what is needed;

*Trade-off between more security (and less) privacy:* This issue needs explicit consideration. Sacrificing privacy was often mentioned as a trade-off for higher security. On the one hand, “pro-privacy” was considered a condition of being personally affected (or not) rather than being subject to conscious consideration: “As long as I don’t need it I am against privacy affecting technology – but if I need it I want it and take privacy affecting aspects into account” (e.g. the linking of data that might prevent me from getting a medication that I am allergic to). On the other hand, e.g. surveillance was seen very critically. Privacy is obviously a controversial issue:

- People would not want to be supervised – conflict of interest between those who provide and those who receive care;
- Antipathy against surveillance is high, fear of patronizing – potential conflicts between the generations;
- Danger of monitoring and external data use by strangers when the system is based on data transfer (e.g. hackers);
- What is real or perceived security? Limits of security technologies are not communicated;
- The level of visibility of technology was criticized – a balance between not too much (frightens) and a minimum (gives security) should be found.
- Illusion of omnipresent technology– there will always be “missing links” which may be dangerous if not expected and explicitly addressed;
- Legal factors: what happens in the event of an accident (and if the technology was not able to detect it or help)?;
- The sensibility of monitoring implies the need for more conscious and explicit information and education on monitoring (functions of) systems on

#### **Ambivalent ATs in caring sector**

#### **Security versus privacy**

behalf of the multipliers. The care-taker and the older adults should therefore be well trained and care-takers should be able to explain the functions of technical systems to older adults.

It is necessary to state that these arguments show an obvious need for clear legal frameworks (and their communication) to avoid threats to privacy. Privacy is a fundamental right for human dignity and needs to be secured.

**ATs may foster or  
impair autonomy**

*Trade-off between support and threat of perceived autonomy:* Older adults want for instance to decide on who will visit their home to provide help. A perceived decrease of decision power may prevent older adults from using various supportive services. A scepticism regarding a potential lack of autonomy (“If my actions are supervised, am I still living autonomously?”) can be observed.

*Trade-off between mobility and potentially under-challenging situations:* Mobility and leaving the house, if still possible, should not be replaced, and supporting devices should not replace challenges. E.g. walking without help as long as possible can contribute to greater fitness. Nevertheless, an elevator needs to be there to guarantee mobility once the stairs become a barrier that cannot be overcome any longer.

## 4.5 Relevant conditions for R&D of ATs

Interviewees mentioned a number of requirements in relation to the R&D of ATs. The authors have here made the attempt to categorize these statements to different phases of technology development and implementation as follows:

- Planning phase of R&D and design of ATs;
- Testing phase of AT as products, services and systems;
- Development of the market for ATs.

In all phases the issue of user integration was considered very important. Successful communication between users and producers was said to be the key to the development of user-friendly and accepted products and important for the whole process. The insights into participatory activities are thus summarised in section 4.7.

**User-friendly  
technologies that have  
proven to be of use in  
extreme situations  
as well**

*Planning and design* of R&D implies an awareness of the risk of under or over challenging the users by technical design. Simplicity of solutions in various contexts (e.g. colours to improve the visibility of objects) was considered a key success factor. It was for instance mentioned that if the daily routine of older adults was well known, comparably simple security “technologies” could work too (e.g. an emergency was assumed if less than two litres of water were consumed per day). There was a demand for more user-friendly devices with fewer<sup>7</sup> features (e.g. conventional remote controls are far too complex to handle). It should be taken into account that people need special capabilities and fine motor skills to work with digital devices for daily use. Moreover all the “senses” should be addressed (hearing the clicking, feeling something moving and seeing something blinking). The modular design of products was recommended as an appropriate strategy to allow cheap production and high individual adaptability of products.

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<sup>7</sup> Not necessarily in number – it has to be manageable.



The time for the *testing* of products should be optimized (to avoid testing too late during the development phase – when important decisions have already been taken). Different critical situations should be taken into account as well as e.g. in panic situations people react differently, or things might be different if errors occur in systems etc. The sensibility of the users' situation was considered to imply that standards for user tests are well developed. It was seen very critically if customers are faced with trial and error in terms of half-developed products on the market that might produce over-challenge, false use or frustration etc.

*The development of the market for ATs* was said to be highly dependent on the sound exchange of information on technologies from the developer to the distributor. Information provision and decision support for older adults to choose, purchase, install and use new devices was regarded as important. In terms of a sound information provision a decoupling of information providers or consultants and the producers of ATs seems desirable. In other words there should be neutral platforms which contain comprehensive information which is not limited to certain product labels. Moreover, affordability is an important issue for the widespread use of products. However the decision of users to buy a certain AT would depend not only on costs but also on the image of certain products. As soon as products are labelled as “medical support”, perceived security may increase for older adults, along with an increase in price, while at the same time the image of being weak is transported. Users were also considerably influenced by recommendations of their doctor, family etc. in terms of decision making.

**Active user integration in all phases of technology development**

**Market for ATs displays unique properties**

## 4.6 Policy and regulation

Different policies were addressed to improve the image of aging and support an adequate perception of growing or being old. Measures should be provided to prepare people for retirement – they should be sensitised in time and supported in terms of consciously planning for the third phase of their life.

Media institutions were criticized that they focus only on scandals or treat older adults as “older youngsters” rather than providing adequate programmes for older adults and addressing these as respected members of society with specific preferences; the media play a crucial role here for raising awareness of individual needs, which change significantly during a lifetime.

A clear language and a consistent terminology were suggested not only for media and policy, but also for individual R&D programmes and projects to facilitate communication between users and developers.

Some important results for R&D policies for AT are:

- A consideration of related issues, such as health care, alongside ATs is identified as being important in terms of the coordination of services and legal frameworks.
- Health care policy was addressed to encourage individuals to start using ATs at an early stage because the right time to start using ATs was considered very important (medical problems should be tackled as soon as possible – e.g. beginning hardness of hearing before persons adapt to it).
- It was mentioned that males and females were partly considered to act differently in terms of their acceptance of AT and its early use.

**Different policy actors are considered responsible to provide adequate frameworks for ATs**

- Rural-urban differences were emphasized in terms of personal relationships between users and their environment, access to ATs, information provision, awareness building activities and training.
- Continuity of training and long-term support (in a sensitive way) for older adults were considered important.
- Education policy was addressed to support inter- and transdisciplinary cooperation (inter-disciplinary knowledge and skills were considered important).
- It was mentioned that technical education needs to provide additional contents in relation to aging such as the integration of social, psychological or ergonomic contents. Generally the need for the integration of the “aging” issue and the need for acquiring real life experiences in medical and technical education were identified.
- In the real world, ATs were considered to be only one element available to deal with problems and to satisfy the needs of older adults: Therefore they need to be combined with various social and organizational solutions.
- The experiences of interviewees show that project applications may take too many resources (time and money) for non-profit organisations. Moreover NPOs and NGOs (depending on the size of the organisation in question and funding situation) would often need full funding for cooperation.

## 4.7 User Integration and participatory approaches

### **Including those who are seldom heard**

According to the interviewees there is an urgent need for the improvement of information exchange, a better understanding of needs to make them a basis for the development of ATs and a better coordination of the interaction between those who are involved or affected, but usually not heard. This section therefore tries to shed light on a better communication between technology developers, distributors, customers and users highlighting some important aspects here.

### 4.7.1 Scope of information exchange

#### **Who takes part ...**

In order to identify new ways of organising and improving the information flow between developers of ATs and potential users as well as intermediary groups, it is important to know who is able to provide insights about the environments of older adults. Table 4.2-1 shows potential groups, which were identified in this project, such as technology developers including the ICT industry, health care professionals and care providers (health products/services, social services, and personal daily living assistance), other intermediary actors for the communication, coordination and management of the delivery chain, and last but not least individuals who work with products and services for older adults or older adults themselves.

The secondary analysis shows that experienced persons (e.g. health or social care-takers) and representatives of organised user groups are both important participants as the former may not be represented within the latter. Moreover, the persons involved in participatory processes rarely speak as mere representatives of user-groups or representatives of certain constituencies.

The explicit inclusion of different groups of people who are at risk of being marginalised (e.g. older immigrants) and the active participation of persons in need of nursing in decision-making for the selection of technologies ensures a better understanding of the advantages and disadvantages of technologies for users.

Users and, depending on the topic, other actors as identified in Table 4.2-1 may be integrated in all steps of a research process, such as identifying critical needs, prioritising research areas, discussion of future scenarios, selection of desired technological solutions (ERA-AGE, 2006). The problem definition is the first step of participatory approaches, which is crucial in relation to identifying the key actors and the types of knowledge you need to involve in a participatory project. It has to be made clear what technological problems regarding AAL are at stake and who needs to be involved to provide knowledge in terms of assessing the topic, possible solutions and ways to get there.

Concerning the modes of interaction, the role of caregivers should be considered in particular, as already demonstrated by the controversial role of AT in day-to-day care provision (4.4). Care-providing organisations might integrate the users by providing information, or organising platforms to inform developers from the user's point of view. Nevertheless, intermediary persons in the care providing sector have a critical role in dealing with this challenge as they have a hard job and they are the ones who might face limitations on communication on ATs in terms of time and also in terms of their own information.

Fostering ongoing collaborations between older adults and researchers going beyond the explicit project context may provide a better approach than sequential involvement that has to be established anew each time (as applied in the Senta project<sup>8</sup>).

**... at what phase of a research process?**

**Considering possible limitations**

## 4.7.2 Modes of user integration

Throughout the group interviews and the expert interviews, many concrete examples of the possible organisation of the information flow between technology developers and the users were given. The authors have summarized these nominations into four categories. These categories represent different modes of interaction and go hand in hand with an increasing integration of the user. Thus they focus on gathering real world insights from the participants who play an informative role (A, B), a consultative role (B, C) and lastly a decisive role in shaping the requirements for R&D (C,D)<sup>9</sup>.

**A variety of integrative activities were proposed ...**

### A) Market analysis and consumer research

The classical methods of surveying the demand and supply curves was mentioned as a possible basis for the development of ATs along with more sophisticated methods to analyse and specify consumers' preferences and needs, such as successfully applied in the food industry, which were considered a promising mode of information transfer from the user to the developer.

<sup>8</sup> [www.senta.tu-berlin.de/research\\_e/index-research.html](http://www.senta.tu-berlin.de/research_e/index-research.html)  
[access on 31<sup>st</sup> March, 2008]

<sup>9</sup> This division of participatory activities in terms of the increasing mandate of the participants is also used by Arbter et al. (2007), Slocum (2003) or at first Arnstein (1969).

#### B) *Classical user testing and user integration*

Within the process of R&D, user integration is conducted by presenting the older adults with a prototype, letting them use it and finally integrating their critical feed-back and recommendations into a next phase of product development. Here, of course medical and social care providers can also be asked.

#### C) *Analysis of User Needs<sup>10</sup>*

Researchers spend several days in organisations such as hospitals to identify and discuss the integration of the users' needs. They organise meetings where medical staff in various functions and the users can evaluate the relevance of the technological product, and its implications to integrate their insights into technology development.

#### D) *Increase the "perspective taking ability" by participating in peoples' lives*

The participants of the group interviews and the experts both proposed a mode of research that implies developers and technicians spending a certain amount of time with the people in need (days/weeks/months were mentioned). They were referred to as participatory observations at institutions or internships spent in institutions, or simply accompanying the personnel. Generally, it was considered of high value to participate in the real lives of people in need, and the value of this approach was ascertained on two levels. Concerning the human dimension, it signals respect for the people and fosters understanding of problems. On the level of AAL technology development the chance of bringing together different rationalities in the same situation of facing problems might enable a creative potential that would otherwise be left untouched.

**... and technology developers sharing older adults lives was favoured**

### 4.7.3 Selected participatory methods

The participatory methods we found in the seven projects of the secondary analysis were Consensus Conference, Expert Panel, Focus group, and various specifications of Workshops, with the Scenario workshop having special importance for the discussion of future options (see Table A-5 and the short description of the approaches). Exceeding the scope of user integration participatory approaches involve different actors and display a policy dimension.

**Different methods of participation for different purposes**

Examples of participative approaches that are relevant for Ambient Assisted Living are identified for different purposes and it seems important to distinguish them.

- Enhancement and activation of the technology market for concrete technical solutions that already address problems (Project: OLDES, PERSONA/ establishment of groups of users and developers and technology platforms with user integration).
- R&D on concrete technical solutions addressing well-known needs and the coordination of corresponding activities at local, national and international level (Project: ERA-AGE, "Household technology to help elder people maintain an independent household"/Scenario workshops).

<sup>10</sup> This term is derived from the CUSTODIAN project (Dewsbury et al, 2002) who frame it as user needs analysis.

- Complex social problems related to the autonomous living of older adults are at stake. There is no priority for concrete technical solutions, there are only vague ideas available about possible technical solutions as a part of all socio-technical solutions and the task of identifying further research questions is crucial here (Project: ICT for the elderly/Consensus Conference).

Projects that applied Technology Assessment were designed for:

- Discussion on the risks and benefits of technical solutions for the identification of the most appropriate options as a common application area of Technology Assessment (Project: Pervasive healthcare in the Danish healthcare services/Stakeholder workshops and interdisciplinary working groups).
- Preparation of a regulative framework for technical development; This is a main task of technology assessment for the generation of recommendations for parliaments as well as technology, health, economic and social policy (Projects: ICT for elderly/Consensus Conference, e-Health: Aging at home/Scenario-workshops).

These latter two projects enabled discussions with a broader perspective and a focus on socially relevant issues such as aging and social justice.

#### 4.7.4 Requirements and challenges

In all modes of user integration and participatory approaches a crucial requirement is the agreement of all persons involved, the consideration of the ethical dimensions in the interaction between technology developers and older adults, and a continuous supervision of the researchers in their new role.

Parallel to the results on user integration collected in the interviews we also studied the possible participatory approaches that are applied at European level in secondary analysis (see Table A-4 and Table A-5). These participatory approaches constitute an important element for the successful development and implementation of ATs and require specific communication and process skills. Moreover, their success depends on mental capabilities (appreciation, respect etc.) and availability of physical resources (time, personnel, space and money etc.) for the participatory processes.

Another challenge that should be actively tackled from the very beginning of communication processes is the fact that different needs and values of different actors are involved. If resulting expectations and underlying values remain unaddressed they might negatively affect the whole communication process on ATs.

Some of our experiences in recruiting participants may be helpful here:

- Addressing older adults needs a sensitive balance between being clear (who exactly is the target group) and still not reducing persons to a functional group of persons of a certain age or other characteristics.
- Communication processes need careful consideration to motivate all groups involved, especially older adults, to contribute to the information exchange, discussions and decisions.
- The term “technology” might frighten or discourage people because they assume that they will then need an expertise on technology. Emphasising the problems and needs which are addressed, might help here.

The involvement of participants from different generations with different physical and psychological conditions and the ethical aspects of aging are a challenge to those who plan and implement participatory approaches.

**Ethical standards**

**Sufficient resources for participatory activities**

**Different expectations and fears should be taken up**

**Careful communication**

**Researchers attitude is crucial and ...**

Even if technology developers do not plan and implement these participatory approaches themselves (Projects: ICT for elderly, Pervasive healthcare in the Danish healthcare services, “Household technology to help elder people maintain an independent household”) they need to know about the role of the participation of users in their work and be ready to give them a say in the process as well. It also implies a consideration of this new element of technology development in terms of project planning. Research teams responsible for participative processes need:

**... they have to step back to allow different actors to have a say**

- to involve the non-expert (to include multiple knowledge);
- to keep the research design flexible (to be able to re-design the process and therefore let participants’ arguments have consequences and provide “process-accountability” for participation);
- to adapt the participatory approach to technology development (to integrate the results into technology development);
- to dedicate resources to such endeavours (to make sure the process also has material backing and therefore provides a secure framework).

**Funding schemes that allow inter- and transdisciplinary cooperation**

As an underlying success factor, the funding organisation also plays a crucial role in providing schemes that allow for the required degree of flexibility and conviction of the use of such procedures for the issues at stake and for the parties involved. Challenges to the inter- and trans-disciplinary approaches such as the generation of a common language and a common understanding need to be addressed.

The findings of the project pTA Aging highlight that coordinating participative processes and communication with technology developers is an important factor for success of technology development and improvement of usability of technical solutions for AAL. Active training of engineers in hospitals, homes for older adults etc., in order to make young engineers aware of real needs of users may for instance be promising. Moreover, shaping ATs for people with special needs involves activities, knowledge, interests, values and resources of different groups. Combining all these factors is not an easy effort but a successful design and application of ATs requires bringing them together at certain points of the research and development process.

## **4.8 Lessons to be drawn for R&D of ATs**

The following sections summarise major lessons drawn from the interviews and the secondary analysis. After sketching the scope of potential impact of ATs, potential pitfalls and respective recommendations to overcome them are provided. Last but not least some challenges, such as e.g. the underlying problem of societal attitudes towards aging, are touched. The additional sources added here are derived from the literature survey and are meant to provide examples of some statements.

### 4.8.1 Impact of ATs on different levels

ATs may be analysed in terms of their impact on the individual level but also have to be integrated into a broader societal context, e.g. what is the meaning of aging and what is the role of institutions or the state (see also Jarré 2008). The digital divide needs to be addressed as older users have less access and are still less optimistic about IT and the options to use it for societal integration (e.g. Demunter 2006; Shelley et al. 2006).

On a policy level it was considered that the combination of technological innovations with conventional structures may lead to failures. Hence, beyond the mere technological compatibility of systems, the coordination and adjustment of technological systems to social or institutional routines should also be considered (also on a programme level).

The analysis of the potential impact of ATs has to take place in the context of basic needs derived from activities of daily living (ADL) such as eating, sleeping, being mobile (Katz 1970; see also Howell, 1994). Based on our results we here also include the dimension of meaning of life and fulfilling activities as basic needs for living both autonomously and integrated into society (Juchli 1994). Autonomy is influenced by being accepted and integrated in society, having the information and necessary training to deal with the challenges of life. It is also influenced by the usability of AT, which is a key factor for independent living without being over challenged by technical systems (e.g. Eßer, Espey et al. 1999, 295 ff., Braczyk et al. 1999).

**Coordination of technical and organisational systems**

**ADL, meaning of life and personal fulfilment as basic needs**

### 4.8.2 Challenges for R&D of ATs

Developing ATs that neglect the underlying and varying needs of older adults was considered as an overall pitfall (e.g. Drennan et al. 2007).

**Neglecting diverse needs**

It was considered important to stipulate early usage of AT over the life course. It seems all the more important to know as much as possible about the daily problems and routines of the target group and their values and attitudes. Therefore, the individuals have to be seen in their context (social, psychological and physical) and diverse needs have to be considered. People with slight dementia for instance need help with orientation, such as a radio that repeats e.g. the date at regular intervals during the day. Physical impairments and mental diseases of users require special attention as well (centrally installed microphones of cordless emergency systems should be integrated in a wristband, and the devices should acknowledge deficiencies in hearing, seeing etc.).

Potential drawbacks as perceived for ATs mainly concern the risk of reduced human support, interaction and contact as a consequence of ATs (e.g. Agree et al. 2005; Lansley et al. 2004).

**The risk of social isolation**

At the same time, individual mobilisation – which is also regarded as an important precondition for active aging in terms of communication and interaction – is perceived to be potentially at risk if ATs are implemented and reduce motivation for mobility. “*An assistive device is generally regarded as an enabler in daily occupation, but it can also become a ‘disabler’*” (Hägglom-Kronlöf and Sonn 2007).

Economic and organisational pitfalls are often connected to the issue of a lack of coordination on different levels that leads to inadequately informed users who are not beneficiaries of technological possibilities but rather victims (e.g. if purchased ATs cannot be used or lead to paradoxical effects e.g. immobilisation instead of mobilisation).

**The risk of inadequate information**

**Awareness of avoiding  
privacy losses**

The controversy concerning support by ATs, such as monitoring at the cost of privacy, was predominantly debated following the rationale of personal concern. A perceived individual advantage – if AT addresses a clearly perceived need – causes people to accept certain losses of privacy. Therefore awareness building is important here, as is critically addressing the stereotype of the frail, disinterested older adults (e.g. Jarré 2008; Fry 2000). The importance of proper information as a preliminary condition for conscious decisions along the delivery chain of the ATs plays a crucial role here and addresses the issue of communication (e.g. Roelands et al. 2006). Moreover here again the individual needs must be seen in the light of societal needs and rights.

There are recommendations for the development process of ATs on the level of concrete technical design. This can be seen as a clear message that the currently common paradigm of multifunctionality should be overcome and replaced by simple and plain technology. The frequent change of features, products or technologies is perceived negatively and a continuity of the persons who explain ATs is perceived as being important.

**Inter- and  
transdisciplinary  
cooperation for well  
designed ATs**

In terms of a social and institutional level, concrete situations and social contexts relevant to AT application are specified. The importance of the responsibility of for instance industries to integrate the users' view throughout an R&D process for ATs is emphasised (e.g. co-construction of "lifespan-technology" as a promising concept, see Lindenberger et al. 2008).

The economic and market factors relevant to the development and distribution of ATs was addressed in terms of concrete details such as the importance of the proper labelling of products to make them attractive. As an overall issue, the costs of ATs and their affordability for a broad range of potential users was considered as important.

**Awareness building ...**

Awareness building seems of importance on the level of the potential user as well as on the level of the developing entities for ATs. The former frequently relates to negative attitudes towards aging such as the presumed correlation that an early use of ATs is hindered by repressive mindsets, while the latter relates to the researchers' attitudes towards their potential target group: the older user.

**... information and  
learning are important**

Learning and information provision is considered important in terms of awareness building and technology adoption. It is well known that the overall learning capacity of older people is not reduced but instead requires certain conditions for the mode of learning to be successful: appropriate velocity in content and voice, practice, repetition, atmosphere and teacher patience were considered important. Moreover, the feeling of constantly lagging behind a rapidly improving and changing technological world has been identified as discouraging (e.g. Sterns 2005, Hiemstra 1991).

Learning is also important for technology developers. Facilitating the contact with the world of older adults within the scope of technical and engineering education was also seen promising here (e.g. Gutheil et al. 2006). The improvement of education was considered necessary especially in terms of ICTs for health care and social care providers, too.

**Critical role of the  
multipliers**

Repeatedly, the highly fragmented health-care system in terms of responsibilities was identified as an obstacle to information and knowledge transfer. In this context, a lack of coordination between many involved agencies in Austria was also criticised.

Concerning user integration and participation, modes C and D as sketched in section 4.7 require that the researchers appreciate the active integration of potential users. Secondly, they imply the willingness of the researcher to give up a certain amount of control over the research and development process, as a



problem originally addressed or a conceptualisation may require replacement. These two facets are also a true challenge for the funding institutions. Here, the user is not an object but an active subject of interest who is given the power to influence the research process (Barnes and Taylor, 2007). Here, listening to voices which are usually not listened to and letting variable actors (citizens, lay people, users, and stakeholders such as health care and social care staff etc.) set the agenda, or the provision of platforms for stimulating a dialogue among actors which need to exchange views, knowledge and experiences is proposed (e.g. Parker 2007) is at stake.

To put the needs and not the technological options at the centre of the development of ATs, a shift from theoretical to practical questions might be necessary. This involves a few challenges. The fact that everyone is in one way or the other personally affected by the topic of aging requires a careful distinction, since discussions with experts, for instance, may lead to a kind of confusion between their personal experiences and their professional opinion. Abstract discussions might prevent the identification of needs and risks. Discussions of concrete cases with people who have personal experiences, however, lead to clearer trade-offs between the benefits and risks of certain technologies. Organising these processes requires special communication skills and professional process moderation that e.g. does not leave the participants with open topics and unaddressed items. To express respect for the participants, a reflected and careful language use plays a crucial role.

The development of a common language also seems to be important in terms of clarifying underlying concepts (such as AAL, ATs, well-being or autonomy) as well as in terms of avoiding misunderstandings at programme as well as at project level for the development of AT. Already the use of the term technology may frighten people and make them hesitate to get in contact with such projects. For this reason, the terminology and its use also need careful attention (e.g. Tinker and Lansley, 2005).

Some aspects were identified that rely to the personal behaviour patterns and individual backgrounds of potential users and may affect the application of ATs. Here again a strong influence of a rather negative attitude towards aging could be seen. Some issues related to communication and (a lack of) individual abilities to orientate themselves in a world of abundant options (ATs). Power structures (e.g. economic, allocation) were reflected here as well as the mere absence of access to ATs as factors that inhibit the use of ATs.

Last but not least, aging well is hardly possible if society does not start a debate on social values for fairness and respect between generations. This would mean a social obligation for public and private institutions to integrate the needs of older adults into their planning and services and for individuals to actively express and integrate themselves (e.g. Rosenmayr 2006; Jarré 2008; Tremmel 2003).

***Every participant is an expert as well as (potentially) affected***

***Clear language***

***Attitudes of the users deserve attention***

***Change of negative attitudes towards aging and consideration of the rights of older adults***

### 4.8.3 *Success factors related to needs*

Trying to sum up the diverse yet highly interconnected results, we summarise some obvious factors for the success of R&D in the next two sections.

- Awareness of technology developers and policy-makers of the special needs of the development and implementation of ATs;
- The consideration of basic needs and a regard for the special requirements of older adults, different forms of living (intergenerational living, single apartments, communal apartments etc.), different social environments (family, caring persons etc.), increase the problem-solving potential of ATs;
- Avoiding over- or under-challenging by ATs;
- Special consideration of Careful consideration of
  - the user group of older adults and those with less education;
  - the trade-off between support and social isolation;
  - the trade-off between efficiency and control or bureaucracy in day-to-day care;
  - the trade-off between security and threats to privacy;
  - the trade-off between mobility and under-challenging;
  - the trade-off between support and perceived lack of autonomy.

### 4.8.4 *Success factors related to socio-economic and organisational issues*

- Development of affordable ATs for all; the economic power of older adults should not be overestimated;
- Diversity of possible technical options and compatibility of infrastructure (ATs are e.g. based on fixed networks and cannot be connected to mobile phones);
- Avoiding “de-personalisation” of the care-taking and explicitly involving the social and health service providers;
- Consultation of (in)formal care-takers and other involved professionals to avoid selecting solutions without consulting the relevant information providers;
- Providing access not only to technologies but also to the information regarding the use of products;
- Regarding the participation of older users and intermediary persons as a main research element to avoid degeneration to mere lip service;
- Consideration of local differences in standards and regulations.

## 5 Recommendations

Based on the multitude of results, this chapter aims to summarise the most important aspects relevant to the programme *benefit* and to projects that will be commissioned by it. All recommendations also address different policies (technology, education, social, health, economy etc.). Moreover, the underlying and long-term recommendations should be anchored within the programme *benefit* although they might surpass the scope of an R&D programme. The recommendations are mainly derived from section 4.8 which identified critical issues from different point of views.

This goes hand in hand with the authors' assumption that the success of an R&D programme for AAL also has to be seen in the context of sustainable development. At the same time the following five assumptions are relevant within the reflexive framework of TA and should be monitored to improve the quality of the R&D programme:

1. Consideration and coordination of technological, social and organisational factors to foster innovation;
2. Bottom-up approaches to define the social contexts and the underlying needs as a precondition to the design of ATs;
3. Considering trade-offs between benefits and risks of ATs including socio-economic and cultural dimensions;
4. Coordination of activities at European, national and local level with special attention to geographical and cultural differences and differences between rural and urban needs.
5. Considering a long-term perspective<sup>11</sup> on programme and project level;

According to the authors' view some of the recommendations require further research, for instance because the ways to ensure the claim they make are not yet fully explored.

### 5.1 Recommendations for the programme development

- Coordination of national and international programmes and projects is important in order to
  - be able to address underlying societal questions such as improving the societal attitude towards aging (fostering inter- and trans-disciplinary approaches) as a precondition to aging in a dignified manner;
  - enable co-funding of key activities by different programmes where appropriate (e.g. for health and care providers or infrastructural developments);
  - promote the development of compatible systems (technological function) while ensuring openness to technology.

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<sup>11</sup> Principle 3 in UNEP, 1992, Rio Declaration on Environment and Development 2007 URL: [web.archive.org/web/20070626201643/www.unep.org/Documents.multilingual/Default.asp?DocumentID=78&ArticleID=1163](http://web.archive.org/web/20070626201643/www.unep.org/Documents.multilingual/Default.asp?DocumentID=78&ArticleID=1163).

- Problem oriented approaches (based on needs) should be preferred to merely technology driven approaches.
- The heterogeneity of the relevant actor groups needs to be considered for the selection of appropriate communication strategies and appropriate terminology to successfully reach potential informants and applicants.
- The programme should foster social interactions and promote ATs, which do not replace but support human interaction.
- It should be ensured that ATs address older adults' needs, while considering that individual needs could be controversial to societal needs (rights, obligations, regulations etc.).
- Privacy enhancing technologies should be fostered.

## **5.2 Recommendations for projects of technology development and implementation**

- A common language needs to be developed as soon as different actors are involved, to make sure that key terms and concepts are understood within inter- and transdisciplinary cooperation.
- Different surroundings of older adults have to be taken into consideration:
  - complex and dynamic social relations of older adults (e.g. caretaker, family etc.);
  - physical and material surroundings (economic, living conditions, infrastructure, rural or urban setting etc.).
- Encouraging the integration of participatory activities (inter- and transdisciplinary) in technology development projects as e.g. applied within constructive and participatory technology assessment.
- Strict ethical standards for user integration and technology application are necessary.
- Enhancing user-friendliness by developing technological devices of adequate size and by ensuring simple usage, while also avoiding over or under-challenging of the user.
- Design and functionality should encourage early usage of ATs (“ATs for beginners”).

### 5.3 Underlying and long-term recommendations

Some of the recommendations so far seem to surpass the responsibility and scope of the programme *benefit* such as for instance the need for programme coordination to allow interdisciplinary research on societal questions. However, the claims these recommendation contain may be regarded in terms of goals or visions in the R&D process. Two further aspects which should be considered to ensure the long-term success of R&D for AAL are:

- To ensure fairness and equality the programme should foster
  - affordable products and services that are nevertheless highly individually adaptable (e.g. cooperation between industries and SME), and
  - the improvement of public infrastructure to enhance accessibility.
- Information and coordination of information flow, training and learning should be improved on different levels:
  - Vocational training (e.g. for caretakers as multipliers);
  - Independent and comprehensive dissemination of information on available ATs for potential users (e.g. independent platforms, or visiting services ...).

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# Appendix

*Table A-1: List of all participants of group interviews*

Title	Name	
Herr MSc.	Robert	Em
Frau	Ursula	Frohner
Frau	Martha	Gruber
Herr	Friedrich	Grundeis
Frau	Melitta	Gunsam
Herr DI	Udo	Häberlin
Herr	Eduard	Holubarz
Frau	Agnes	Höretzeder
Frau Dr.	Andrea	Joichl
Frau DI Dr.	Brigitte	Jedelsky
Herr MR Dr.	Rolf	Jens
Frau	Elisabeth	Kalousek
Frau Dr.	Erika	Kanelutti
Herr	Walter	Kiendl
Herr	Peter	Kreuter
Herr DI	Knut	Leitner
Herrr DI	Gerhard	Nussbaum
Herr DI	Paul	Panek
Herr DI Dr.	Franz	Pühretmair
Frau	Selma	Scharmüller
Frau NR. Abg.	Beate	Schasching
Herr	Sarol	Shahbazian
Herr DDr.	Alois	Soritsch
Frau Mag. MSc	Gabriele	Sprengseis
Frau Mag.	Karin	Steiner
Frau	Ernestine	Weiss-Ehrenhöfer

*Table A-2: List of interviewed experts*

Name	Affiliation
Prof. Dr. Clemens Tesch-Römer	The German Centre of Gerontology
Dr. Andreas Motel-Klingebiel	The German Centre of Gerontology
Ao. Univ.-Prof. Univ.-Doz. Dr. Gertrud Simon Ao	Institute for Education, University of Graz
Ao Prof. (FH) DSA Dr. Barbara Bittner	University of Applied Science, Vienna, Applied Social Work
Prim. Univ.-Prof. Dr. Bernhard Iglseider	Christian Doppler Clinic Salzburg/ Geriatrics
V.-Prof. Mag. Dr. Hanna Mayer	Institute of Nursing Science, University of Vienna
A.o. Univ. Prof. Ing. Dr. Karl Kollmann	Austrian Federal Chamber of Labour, consumer policy and Vienna University of EBA, Institute of Technology and Sustainable Management

*Table A-3: All actors relevant to the use, the distribution and the development of AAL as mentioned in the group interviews*

<b>Social Services</b>
<ul style="list-style-type: none"> <li>• Trainers</li> <li>• Consulters I (should help people to prepare their surrounding and house for their needs)</li> <li>• Companies (for senior houses)</li> <li>• Housekeeping &amp; home services</li> <li>• Organisations (Caritas, Hilfswerk)</li> <li>• Exhibitions, Senior fairs (market)</li> <li>• Producers and designers of homes and furniture</li> <li>• Educating trainers &amp; services</li> <li>• Learning: Geragogik as an emerging field</li> <li>• Education to age with dignity</li> </ul>
<b>Health care services</b>
<ul style="list-style-type: none"> <li>• Medical and social care, nurses</li> <li>• Home care providers</li> <li>• Homes for elderly</li> <li>• Care providing services (social &amp; health)</li> <li>• Care taking and health system management</li> <li>• Hospital discharge management</li> <li>• Emergency (call) services</li> <li>• Care providers, nurses [multicultural care-persons]</li> <li>• Physiologists who work in teams for technology development</li> <li>• Physiotherapists</li> <li>• Occupational therapists</li> <li>• Orthopaedic technicians and truss makers</li> <li>• Medical care organisations (for information exchange)</li> <li>• Patients in hospitals</li> <li>• Medical students</li> <li>• Technical teachers for care givers</li> </ul>
<b>Services</b>
<ul style="list-style-type: none"> <li>• Banks</li> <li>• Businesses</li> <li>• Sales people,</li> <li>• Stores, shopping centres (central-decentralised)</li> <li>• Mobility services</li> <li>• Consultants II Coordination in consulting is important – often intermediate solutions are used as permanent solutions; caretakers, relatives and IT technicians</li> </ul>

*Table A-3: All actors relevant to the use, the distribution and the development of AAL as mentioned in the group interviews (continuation)*

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<b>Social networks</b>
<ul style="list-style-type: none"> <li>• Users themselves, end-user</li> <li>• (individual) older adults</li> <li>• Adults with extensive personal experience</li> <li>• Partners of older people</li> <li>• A person whom older adults trust, contact persons</li> <li>• Acquaintances</li> <li>• Family</li> <li>• Friends</li> <li>• Neighbours,</li> <li>• Relatives, helping people</li>   <li>• Older adults who live together in a group,</li> <li>• Older people who know each other and start an initiative to support each other</li> <li>• And organize groups (Telefonring),</li>   <li>• Snowball principle in own peer-group</li> <li>• Social peer groups of those who share common interests</li>   <li>• Disabled people, handicapped people</li> <li>• Disabled people managers,</li> <li>• responsible community nurse</li>   <li>• Social and medical service institution</li> <li>• social care organisations (for information exchange)</li> <li>• cultural institutions</li>   <li>• Employer</li> <li>• Employer (has the responsibility to facilitate continuous (on-the-job) training)</li> <li>• Healthy (and satisfied) workers/employees are cheaper in the long run – the work should be “value intensive”</li> <li>• Older Adults as employees</li>   <li>• Society</li> <li>• All generations – example Netherlands “Dorf im Dorf (village within the village)”</li> <li>• And grandchildren can teach their grandparents how to use technology – good combination of intuitive use and carefulness</li> <li>• Different generations, future generations, younger adults, young generations</li> <li>• Young people in general, young people as users of communication products, providers of web services,</li> <li>• Younger generations [people aged between 30–40 as target group for technological developments of AAL (scepticism will dramatically decrease)]</li>   <li>• There is no compensation for gossiping only</li> </ul>

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*Table A-3: All actors relevant to the use, the distribution and the development of AAL as mentioned in the group interviews (continuation)*

<b>Public infrastructure</b>
<ul style="list-style-type: none"> <li>• Legislature</li> <li>• Policy (to start a broad social debate with a positive or a realistic view on aging and society)</li> <li>• Politicians, political actors</li> <li>• Public infrastructure and public services,</li> <li>• Transport organisations</li> <li>• City planners, regional planning institutions</li> <li>• Architects, construction firms</li>   <li>• Media (TV, radio, newspapers)</li> <li>• Media as important actors to transmit information here</li>   <li>• Networks of qualified people and institutions,</li> <li>• Non-profit organisations</li> </ul>
<b>Developer</b>
<ul style="list-style-type: none"> <li>• Children and parents of developers as test persons</li> <li>• Industry</li> <li>• Designers</li> <li>• Developer (of devices)</li> <li>• Consulters</li> <li>• Funding organisations</li> <li>• Industries,</li> <li>• Enterprises</li> <li>• R&amp;D enterprises</li> <li>• R&amp;D</li> <li>• Small companies to optimise solutions,</li> <li>• Engineering students, technical universities</li> <li>• Technicians should familiarise themselves with the work of care givers</li> <li>• Technology developer or the “freaks that develop technology”</li> </ul>
<b>Information flow</b>
<ul style="list-style-type: none"> <li>• Information can be provided and test persons can be recruited via newsletters published by the Red Cross and other NPO’s;</li> <li>• Experts of technology assessment</li> <li>• Supervisors,</li> <li>• Food industry and other industries (which pay attention to local needs, to serve as good examples)</li> <li>• Food producers and toilet paper producers (know so much about the habits, tastes and preferences of their customers – technology development could learn from these industries)</li> </ul>
<b>Others</b>
<ul style="list-style-type: none"> <li>• Animals as a means of social contact</li> </ul>

Table A-4: Overview of the projects analysed within the secondary analysis (date of access: 29 May 2008).

Activity type, Activity name & URL	Start & End	Key issues
project PERSONA: Perceptive Spaces Promoting Independent Aging <a href="http://www.aal-persona.org/">www.aal-persona.org/</a>	Jan 2007- June 2011	One activity line is to establish group of experts and users to investigate interaction between users and services for Ambient Assisted Living.
project OLDES: Old people's e-services at home <a href="http://www.oldes.eu">www.oldes.eu</a>	Jan. 2007- Dec. 2009	The target is to establish a technology platform with participation of users for user tests. The project refers to the development of affordable technical solution, standardized procedure for tele-care interactions, program to evaluate results and a profile of older adults.
A group of projects Household technology to help elderly people maintain an independent household, subprojects: Social Sciences, Ergonomics, Engineering Design, Product Design, Communication Engineering, Coordination & Architecture <a href="http://www.senhta.tu-berlin.de/">www.senhta.tu-berlin.de/</a>	Jan 97-2003	This inter- and trans-disciplinary project with scenario workshops aimed to embed the technology development for assistive technologies for older adults in its social context. A project within the framework of the group of projects was specially designed for this reason. The idea of Senior Research Group on technologies for older adults is generated during the project. This working group of older adults still continues to pursue its activities.
Project and Sub-project ICT for elderly people and a scenario workshop for its preparation <a href="http://www.eptanetwork.org/EPTA/projects.php?pid=136">www.eptanetwork.org/EPTA/projects.php?pid=136</a> (accessed on 29 May 2008) report: <a href="http://www.teknologiradet.no/ICT%20for%20elderly%20people_wNGky.pdf">www.teknologiradet.no/ICT%20for%20elderly%20people_wNGky.pdf</a>	1999-2000	Scenario workshops were organised to prepare information for a consensus conference with participation of experts and lay people.
Project eHealth: Aging at home <a href="http://www.eptanetwork.org/EPTA/projects.php?pid=399">www.eptanetwork.org/EPTA/projects.php?pid=399</a>	2007-2008	Scenario-workshops in different municipalities are organised to consider local needs. A key question is the preconditions for the development of effective and human care services.
Project Pervasive healthcare in the Danish healthcare services <a href="http://www.eptanetwork.org/EPTA/projects.php?pid=85">www.eptanetwork.org/EPTA/projects.php?pid=85</a> A new project of DBT "new technology in elderly care" is also in process. <a href="http://www.eptanetwork.org/EPTA/projects.php?pid=145">www.eptanetwork.org/EPTA/projects.php?pid=145</a>	2005-2006	Stakeholder workshops and interdisciplinary working groups with users were organised to discuss the preconditions for the implementation of pervasive health care systems. A new project will investigate which technologies will be the driving force for developments in elderly care in Denmark, and how these can be implemented so that management, employees, end users benefit from it.
Programme-coordinating project ERA-AGE: European Research Area in Ageing <a href="http://era-age.group.shef.ac.uk/">era-age.group.shef.ac.uk/</a>	March 2004- Feb. 08	The project contributes to the coordination of existing research programmes on aging, older adults and the exchange of knowledge. Joint activities should support bridging the gap between relevant science, policy and practice.

The secondary analysis was reviewed by Ida Elisabeth Andersen, an expert at the Danish board of Technology working on the topics of aging and technology assessment. Her valuable comments are also included in the results of this report.

Table A-5: Comparative chart for identified participative methods

Method	Objectives	Topics				Participants	Time		€
		Knowledge	Maturity	Complexity	Controversial		Event	Total	
Consensus Conference	Consensus and a decision on a controversial topic	+	+/-	+	+	10 to 30 randomly selected citizens, others give input	3 weekends	7-14 months	4
Expert Panel	Synthesise a variety of inputs on a specialised topic and produce recommendations	-	-	+	+/-	Experts	variable	variable	2
Focus Group	Expose different groups' opinions on an issue and why these are held (reasoning)	+/-	-	m	+/-	Stakeholders and/or citizens	2 hours-1 day	1 month	1
Scenario building exercise	Planning and preparedness for uncertain future, vision-building	-	-	+	+/-	Anyone	2-5 days	6 months	1-3

Slocum, 2003: 23

Legend, explanation and chart symbols for Table A-5:

Topic	+	medium	-
Knowledge	Much common knowledge exists		There is little common knowledge
Maturity	Most people have already formed opinions on the subject.		The subject is new, people are still forming opinions on the subject.
Complexity	Highly complex or technical		Not very complex or technical
Controversial	Highly controversial		Not very controversial

Note: +/- means that the method can address either + or -

€: 1: inexpensive, 2: moderate, 3: expensive, 4: very expensive



**A short description of methods in Table A-5:****Consensus Conference**

A consensus conference is an approach for active participation of citizens in decisions about recent and socially controversial topics that address normative questions which are relevant to large groups of society. Usually, 10 to 30 citizens are informed about topics and define key questions on a first preparatory weekend. Following presentations by experts they direct their questions to a panel of experts on the second weekend. The public consensus conference finally starts with three days of presenting answers proposed by the experts. Based thereupon citizens formulate their recommendations which are directed to parliament and hence inform policy making processes. The Danish model aims to reach a consensus but there are other models without a direct target of consensus. The approach has also been used for *“research projects and as a means for promoting social awareness and public debate.”* (Slocum, 2003:64)

One important pitfall for this method is an unrepresentative recruitment of participants. In addition, multiple conferences would be necessary to ensure the inclusion of a broad spectrum of opinions.

**Expert Panel**

Expert panels are used to synthesise expert recommendations from different available sources of knowledge in different disciplines. They start with defining the topic of discussion and determining the desired composition of the panel. Potential participants should be interviewed for a better overview of the composition and balance of the panel. A panel chair should be selected. He/she is responsible for organising meetings and presenting the results. A technical writer as a panel member could be a great advantage. The contents of panel discussions are confidential as long as the final report has not been published. The report includes references and outlines agreements and disagreements. It should give a good overview of background arguments. The report is in general made available to the public.

A pitfall of this approach would be obviously interfering conflicts between panel members. Panel members have to be ready for open discussions and avoid the presentation of interests of a special group. Moderation of panel discussions is a key factor for motivation of participants.

**Focus Group**

Focus groups are designed to gather information about interest and needs of stakeholders, to perform, inter alia, explorative research in marketing or political analysis. The process is flexible and can be performed for 4 to 12 participants. The divergence of opinions and the flexibility of the process may reduce the possibility for generation of clear recommendations. There are also focus groups which can be performed in series and via telephone.

A pitfall is that people might not feel comfortable and therefore don't participate, or single persons try to dominate the discussions. The atmosphere of a focus group is very important to generate trust and encourage participants to engage in discussion. Questionnaires should not be used in focus groups. A record of the process should support the documentation.

### **Scenario building experiences**

“What-if scenarios” are appropriate when the future outcome cannot be predicted easily because a problem is complex, the time-horizon for decision-making is long or there are different kinds of uncertainties. “What-if scenarios” support, inter alia, the generation of action-plans.

“What-if scenarios” start with the definition of assumptions based on desk research and interview results.

*“The main information required includes:*

- *critical trends, especially very long-term trends that are expected to continue*
- *factors of change or future-shaping events that could alter even the seemingly most established trends*
- *the roles of the various categories of stakeholders*
- *events that can alter the environment in the future.”* (Slocum, 2003: 156).

The factors which change the scenarios should be selected from the list of relevant issues for decision-making. The number of generated scenarios depends on the aim of processes. Multiple scenarios are necessary for exploratory “what-if scenarios” to analyse different possible outcomes. For normative scenario building there is usually one desired outcome.

Examples for pitfalls of “what-if scenarios” are the selection of inappropriate assumptions or different interests of decision-makers and those who develop “what-if scenarios”. Scenarios should be based on clearly defined assumptions and they should be understandable for decision-makers and the public.

### **Miscellaneous (e.g. Workshops)**

A workshop is a kind of meeting which is organised for different types of participative processes. Examples are scenario workshops, stakeholder workshops, the Charrette Workshops etc. *“The Charrette Workshop is an intensive planning and design workshop involving participants in assessing needs, interviewing stakeholder groups, prioritising issues, developing recommendations, identifying specific projects and generating implementation strategies.”* (Slocum, 2003: 34).

Depending on the context and goal usually short events allow information exchange between researchers and participants.

Pitfalls of workshops are caused on account of their variety and their apparent simple organisation. As a matter of fact workshops need clear goal communication, a clear agenda and a structure that allows people to easily follow and also benefit from the discussion in a certain way.

### **General pitfalls for participatory methods**

The success of participatory methods can not be easily assessed because of the multifunctional character of participatory approaches. It is much easier to identify pitfalls and try to avoid them. Pitfalls should be identified for all important phases of participation processes, namely the planning, preparation, accomplishment and post-processing (documentation, analysis and follow-up) phases. Clear guidelines and goals, good preparation, appropriate and flexible moderation of the process, transparent and comprehensive documentation and assessment of results might avoid many pitfalls. Nevertheless, the key factor which should be regarded is the selection of the most appropriate method for each case. A “fit for all” option is not available for participatory methods.