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Critical Factors involved in End-Users' Education in relation to Assistive Technology



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EXECUTIVE SUMMARY

This document presents the results of the research carried out under Workpackage 3 of the EUSTAT project. It is intended as a background study for three other documents that are planned as end-results of EUSTAT:

- an inventory of existing educational initiatives on assistive technology for people with disabilities and elderly people
- a package of educational material directly addressed at the end-users of assistive technology
- a set of guidelines for educational initiatives that aim at promoting the empowerment of the end-users through transferring them proper knowledge on assistive technology.

In the context of this study, the term “end-users” refers primarily to people with disabilities and elderly people. However, it also encompasses their family members, helpers and personal assistants whenever assistive technology has an impact inside the whole primary network around the individual.

The term “critical factors” refers to any aspect that deserves careful consideration when approaching the issue of transferring knowledge to end users, with the ultimate aim of achieving their empowerment or preparing the ground for it.

A first finding was that the empowerment process is primarily a matter of personal growth: it requires the contribution of something much broader than just pure technical knowledge. For this reason a detailed analysis was carried out concerning the various issues related to the empowerment of end-users in relation to Assistive Technology. The path that leads from the identification of the need to the concrete expression of a choice was carefully studied, in order to find out which elements of knowledge are needed to promote empowerment.

Various kinds of knowledge were discussed: theoretical, procedural, practical, and know-how. Five types of knowledge transfer processes were identified and described, each having a specific role and complementing the others: counselling, education (this term encompassing in turn two different processes: training and teaching), information, awareness campaigns.

The education processes (teaching and training) fall within the specific EUSTAT scope. Therefore the factors that deserve consideration in the operation of educational initiatives were analysed in more detail, leading to a systematic classification of critical factors. These are clustered around four main headings:

- positioning factors of the educational process
- factors relevant to the transfer of knowledge to groups of people
- factors relevant to the reception of knowledge by the individual
- factors relevant to the transfer of knowledge into initiative.

This study also includes an extensive literature review that brings together the contribution of various disciplines related to this field, and offers a detailed analysis of existing handbooks that can be useful for educational initiatives.

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1. INTRODUCTION

1.1. OBJECTIVES OF THE STUDY

1.1.1. Background

The main aim of the EUSTAT project is to develop training models and educational material that contribute to empower persons with disabilities and elderly people to make informed and effective choices of assistive technology.

Knowledge is one of the key factors for empowerment. The more the end-users are knowledgeable about assistive technology, the greater influence they can exert in the process of purchasing (or getting through a service delivery system) the right technology that compensate for their disabilities and help to achieve a more independent life, full participation in all aspects of their social life, and self determination.

The term “independent life”, according to the most recent literature in the field, makes no reference to functional abilities: it does not mean “doing everything without any external human help”. It is a dynamic concept continuously enriched by ongoing discussion at international level (see <http://www.independentliving.org> as Internet entry site). In general terms it is used to indicate that persons with disability take control over their lives, can access the same opportunities and face the same choices in every-day life that non-disabled persons take for granted. Depending on cultural contexts and individual expectations, that may include a variety of aspects like growing up in their families, going to the neighbourhood school, using the same bus, getting employment that is in line with their education and abilities, having equal access to the same services and establishments of social life, culture and leisure. Just like everyone else, persons with disabilities need to be in charge of their own lives, need to think and speak for themselves without interference from others.

In conjunction with other supports, like a barrier-free environment, personal assistance facilities etc., assistive technology plays a substantial role in facilitating independent life. Having the end-users as main actors in the choice of the proper assistive device, as responsible, informed and demanding consumers, is consistent with the independent life approach, facilitates acceptance of technology, and can also result into better effectiveness and utility of technology.

In addition, providers of assistive technology can get a more comprehensive feed-back from their client, and learn useful elements for improving quality of products and services. It would not be wise to consider end-users simply as passive recipients of medical, technical, social and administrative services: they have the experience of disability, thus are in the position to evaluate aspects that only practical daily experience can reveal.

There are many arguments, both at individual and societal level, supporting the idea of promoting the empowerment of end-users. However, the achievement of this objective is not always so immediate. There may be complex financial, organisational and cultural barriers in society; but even if we restrict our analysis to just the subject of this document, the transfer of the needed knowledge is not so simple. Identifying all aspects to be considered and addressed in the education of end-users was the challenge of this study.

First of all, the concept of *end-users* of assistive technology (AT) needs to be defined. In the context of this study, it refers primarily to people with disabilities and elderly people. However, it also encompasses their family members, helpers and personal assistants whenever assistive technology has an impact inside the whole primary network around the individual. The term *end-users* is adopted to distinguish them from other actors (e.g. rehabilitation professionals, assistive technology providers, etc.) who can be also considered “users” in a broader sense, in that they use AT as a tool for their professional activity in the field of disability. These will be identified in this paper as *AT providers* or *AT advisers*.

In the process leading from the expression of a need to the acquisition of AT by the individual end-user, a number of steps have to be overcome and several decisions have to be taken. Some of them may extend also to the family or the primary network around the individual. Knowledge helps to find the way through the various steps, and supports decisions. The needed knowledge may be in the hands of the concerned person, may be distributed inside the primary network, or may be sought from external advisers.

There is no fixed recipe on where the specific component of knowledge has to be: factors related to age, culture, pathology and available social services have certainly an influence on the extent and on the deepness of technical information that can be transferred directly to the end-user. On the other hand, it is not necessary for the end-user to be a technical specialist in AT: rehabilitation professionals and technology providers are expected to be such. There are people who may be eager to achieve full command of technical topics, but the majority of end-users may be quite satisfied by just a basic background on the AT that can be useful with respect to their disability, provided they have the possibility to resort to qualified professional or peer advisers when needed. Again, empowerment does not mean “doing

everything alone”, but being actor and protagonist of the process. This may sometimes involve also acting in partnership with professionals, deciding to follow their advice, finding the most efficient compromise in case of unavoidable financial barriers: for sure it does not mean to completely *depend* on the decision of the professionals.

The guiding idea of this study is that each end-user should be provided with the maximum amount of sustainable and useful knowledge. This sentence may be smart, but opens a question around what is “sustainable and useful” for each individual and who is going to decide that. If the answer had been simple, there would be no reason for this study. In fact an ultimate answer doesn’t seem possible. The transmission of knowledge is a dynamic process; it never ends because persons change in response to knowledge: new horizons opens, new needs arise, new challenges appear. So it cannot be solved through the provision of a simple set of information and notions. It requires an *educational approach* assisting the persons in their changes.

To design and carry out suitable educational processes, a number of critical factors need to be *identified* and *addressed*. The scope of this study covers first aspect, the identification of critical factors. Another study within the EUSTAT project (Guidelines for courses for user empowerment in relation to AT) will face the challenge of addressing critical factors.

In the following chapters a great deal of aspects will be analysed and weighted with regards to their possible influence on the process of user education in relation to AT. The main focus will be mainly the impact on the individual (personal growth towards autonomous life, coping better with disability in daily life etc.), although also some societal impacts can be expected as a direct consequence (eg. exploiting the expertise that disabled and elderly persons can offer to other persons with disabilities, to rehabilitation professionals, manufacturers and providers as field-evaluators, etc.).

1.1.2. Contents

The “fil-rouge” behind this study is the process that leads from the expression of the need to the choice of assistive technology. Having that in mind, the educational needs and the related critical factors are gradually brought to light.

The introduction (chapter 1) enlightens the philosophy of EUSTAT project (Background), clarifies three basic concepts (autonomy, AT, critical factors), describes the contents and explains the methodology.

The second chapter deals with the relationship between assistive technology and its end-users, and describes the transfer of knowledge as a key factor for bridging the gap. It covers:

- the end-users views, the problems they encounter, the needs they express and the solutions they look for.
- the opportunities and the limitations provided by assistive technology
- the type of knowledge that can be transferred to the end-users, and the methods to achieve it.

Finally, it will discuss domains where factors can be considered “critical” in end-users education. It looks at the following aspects:

- the details of the process that leads from the need to the choice
- the distinction between factors of general order and individual (specific and unique) order
- the various domains where critical factors appear (without attempting to rank them in a hierarchy).

In the third chapter, a systematic classification of critical factors is offered. It is based on a model of the educational process that looks at the sequence of logical steps through which a body of knowledge takes shape in the mind of the organiser of an educational initiative, is delivered to end-users, and gradually results into their empowerment.

The fourth chapter lists the supporting literature. It is divided into three sections :

- the references that have been selected, read and analysed as the primary sources for this study;
- a review of selected handbooks on AT that are deemed useful for the purpose of end-user education;
- a selection of titles for further reading.

1.1.3. Methodology

The first basis for this study was provided by an extended literature review on assistive technology, disability, gerontology, autonomy. Many useful reports were found among the materials of the DG13/TIDE/HEART study, and the DG5/HELIOS programme. Elements were found for identifying, classifying and describe the body of knowledge on AT. Methods by which such knowledge can be transferred to end-users (to help make choices, to use AT, to solve related practical difficulties in daily life) were analysed.

This process that leads the end-user to the choice of AT was divided into four stages:

- the definition of the end-users' needs;
- the determination of the end-users' goal;
- the establishment of an individual project;
- the decision.

Extensive (both telematic and live) discussions inside the Consortium, and also discussions with selected external user groups helped to collect views concerning each of the four stages. Such discussions

were carried out as brainstorming session, where each participant was allowed to be creative and to share his/her own experience.

Additional information was also collected through structured interviews, based on a questionnaire/check-list that every partner administered to some end-users' organisations. Some questions were very broad (e.g.: "What, in your opinion, are the important criteria in choosing the AT?" etc.), other aimed at eliciting practical experience (e.g. : "Has AT had an impact on the following situations?" etc.), others asked for views about education (e.g. : "Do you feel sufficiently "trained" in matter of AT?" etc.). The questions were "closed type" (yes/no), each split into several sub-questions. In some cases the questionnaire were self-compiled by the respondents, in other cases it was used by an interviewer as a "think tank" for discussion.

All element arising from this study were discussed inside the multidisciplinaryEustat research team, and compiled in this document after a number of iterations. Two independent external reviewers examined it at a draft stage: they provided useful criticism and valuable inputs that have been taken into account in this final version.

1.2. BASIC CONCEPTS

1.2.1. First keyword: **Autonomy**

The ultimate goal of assistive technology is often described in terms of social keywords like quality of life, social integration, independent living. However, these achievement should be seen as a result of a number of factors and circumstances, one of them being AT. Examples of other factors are environmental accessibility, personal assistance, social provisions, affirmative legislation (e.g. anti-discrimination laws as the American with Disabilities Act, 1990), acceptance of diversity in the community, financial support, and so on. In the ongoing discussion around the concept of independent living, somebody argues that a person with disability who has deep knowledge of AT and full ability to make the best choice, but avails no financial mean, no funding, no public service delivery system respectful of his or her choice, very hardly could pursue a project of independent life.

On the other hands, the role played by the individual should not be underestimated in favour of just societal factors. Achievements in quality of life, social integration and self determination require the full participation of the individual person with disability, as main agent in defining his or her goals and projects, and main protagonist in carrying out actions for solution. Like a mechanic watch requires that all cogwheels be in place, but works only if the spring is loaded, likewise a

“spring” is needed inside the person, that includes motivation, ability to identify and formulate needs, decision on goals, willingness to pursue projects. This “spring” will be described here with the term *autonomy*.

While compensating for impairments or disabilities or removing handicapping barriers (effectiveness in doing that is easily measurable even by external observation), it is the authors’ belief that the more AT is consistent with a project of *autonomy*, the more it will be beneficial and useful for the individual.

Within the professional community it is sometimes argued that a percentage of people with a disability is not able to be really active in the choice of their assistive technology: this may depend on factors like age, cultural level, psychological barriers towards the acceptance of an assistive device during the early onset of disability, unfamiliarity with technology, etc. However, it is not always clear to what extent such difficulty is a cause or rather a result of traditional organisation models in the provision of rehabilitation services. Difficulties should not be underestimated: it may be true that many disabled persons or elderly with a disability will be unwilling to act as "full partners" in the choice of AT; but it is also true that a lot can be done in promoting *autonomy* and thus facilitating their empowerment.

The concept of autonomy is not restricted to persons with full cognitive ability. Even in case of persons in the need of various kinds of support due to intellectual impairment, cognitive limitations, ageing, frailty, disease etc., they can be led to be *autonomous* with respect to their expectations (even in this case AT exists that can help achieve such goal).

In the following a semantic clarification of the notion of autonomy is attempted, following its historical evolution. Such notion has changed greatly over time and is often described very differently by various author.

From a historical point of view, the concept and the importance of autonomy for the disabled arises from a social perspective of the handicap issue.

In a paper on this theme, V. Finkelstein (Finkelstein, 1980) suggests a radical but interesting thought, according to which "disability is an oppressive social relationship" and he argues that "those who carry out research or social analysis of necessity participate in the disabling social

¹ Since the three terms impairment, disability and handicap will appear several times in this document, their meaning is recalled here according to the definition of the World Health Organisation (1980):

* impairment : a loss or abnormality of psychological, physiological or anatomical structure or function;

* disability : any restriction or lack (resulting from impairment) of the ability to perform an activity in the manner or within the range considered normal for a human being;

* handicap : a disadvantage for a given individual, resulting from an impairment or a disability, that limits or prevents the fulfilment of a role that is normal for that individual (in relation to age, sex, social and cultural factors)

relationship". He states that in our society almost every aspect of the life of a person who is disabled has its counterpart in a "profession" or voluntary organisation, and this resulted into the attitude that the disabled individual is obviously particularly dependent upon others for help. One result of that was the image of disabled people as passive objects of research and help.

He identifies three phases in the social and historical process of creating and "eliminating" handicaps.

First, since the beginning of the modern era, although people with physical impairments have always been present as "cripples", they were not segregated from society for the special treatments and services which we recognise today. Crippled people were clustered at the bottom end of the social scale together with other social strata; but they were socially active people, responsible for their actions.

The second phase was inaugurated with the growth of hospital-based medicine and the creation of large asylums: institutions provided the physical means for segregating disabled people from their communities. Here, the characteristic attitude was to view disabled people as suffering from personal tragedies, unable to care for themselves and consequently in need of care and protection. At the same time the success of professional medical and para-medical help has contributed to the increasing numbers of disabled people able to achieve social independence and who thus question professional 'domination' of their lives.

The third phase can be viewed as just beginning, setting the context for the generation of new attitudes. The move towards increasing independence in the community marks this change. For sure a major impetus for this development has been provided by the latest advancements in assistive technology: think eg. what the appearance of the market of the first environmental control systems meant in terms of increasing independence of the disabled and elderly persons. Phase three heralds the "elimination" of handicap.

Within a social perspective of the concept of autonomy, some authors (Engelhardt, 1992) consider a person as *autonomous* on one condition: that he or she can manage all mental faculties, acts as a rational person, without being subjected to external pressures. A weakness of this assumption is that it excludes anybody who experiences cognitive limitations (due to dementia, mental retardation, head injury etc.).

A different idea of autonomy comes from a more global approach to the person which emphasises social and relational aspects. This was due to a large, stable change in thoughts which occurred in the 40s, thanks to many authors from various disciplines who stressed the importance of the cultural and social environment. The Russian psychologist L.Vygotskij (whose works have been published in the

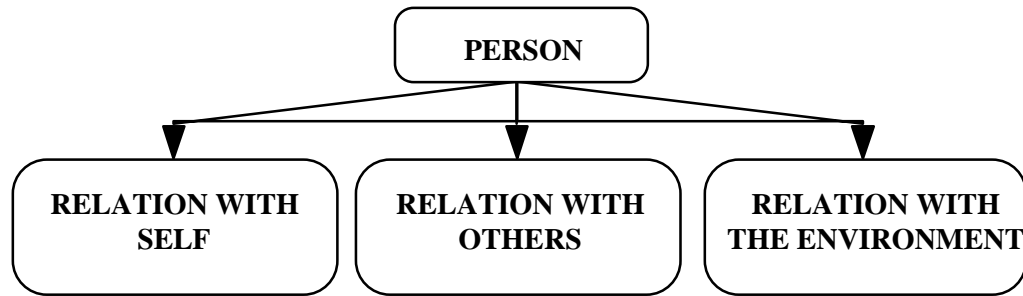
western world in the seventies: Vygotskij 1978), underlined the role of the social context and the social actors in the individual's cognitive development. G.Bateson (Bateson 1972 and 1979) proposed the idea of the social construction of meanings and studied human communication as a circular process and not a linear one. This corresponds, in the world of medicine, to the great idea that it is the relationship between nature and culture that builds a person - and cures him/her - which brought to widespread ideas about the so-called "welfare-medicine" whose slogan was "from cure to care".

One of the pioneers in introducing such ideas in the domain of rehabilitation was the Italian physician A. Milani Comparetti (Milani Comparetti 1960, 1981 and 1982), breaking the ground for the first experience of school integration of disabled children to be carried out in the world at a nation-wide scale (the Italian 1975 law on elimination of special schools).

Within the HELIOS I (1988-91) and HELIOS II (1992-96) (the Action Programmes of the European Commission to promote equal opportunities and the integration of disabled people) such global approach was further developed. Autonomy was considered as a dynamic process which includes the individual point of view, the family's point of view, the immediate outer circle, and society. Consequently, four domains of autonomy were described: 1) body and mind, 2) home and family, 3) community, and 4) society.

Consistent with this approach is the relational definition of autonomy as *ability to plan one's own life, to enter into relation with the others and, together with them, to actively participate in the construction of society* (Andrich and Porqueddu, 1990). This definition establishes a kind of equation like *autonomy = relation*, which in turn includes three types of relations: *with self*, *with others*, and *with the environment*. It is apparent that such concept applies to any person, independently on their health or physical or mental status. A able-bodied person may be *non-autonomous* if he or she experiences difficulties in one or more domains of relation; conversely a person with severe disabilities who depends heavily on personal assistance may feel comfortable at all of the above relational levels. The onset of a disability brings about a change in life; so in order to resume a situation of *autonomy* he or she needs a *personal restructuring*, that means to build a new relation with self, with the others and with the environment. In this view, AT is instrumental to such goal: it is *a tool for relation*. The following scheme synthesises the concept.

Autonomy = Relation



1.2.2. Second keyword: Assistive Technology

There are at least two different perspectives, technological and a social/cultural, from which AT can be looked at. Both are dynamic and evolved over time, and should be seen as integrated in a modern approach to AT.

The international ISO-9999 standard (along with the corresponding European standard EN 29999) offers a technical definition of assistive technology: *any product, instrument, equipment or technical system used by a disabled or elderly person, made specially or existing on the market, aimed to prevent, compensate, relieve or neutralise the deficiency, the inability or the handicap.* It is a device-oriented definition, placed before the well-known ISO/EN classification of assistive devices that is used by almost all existing databases in the field.

A. Cook and S. Hussey (Cook and Hussey, 1995) suggest a broader approach, stating that strategies, practices and services don't have to be separated from technology. In that sense, they define AT as *a broad range of devices, technical aids, strategies, services, practices, with the main objective of improving the quality of life of the disabled and the elderly.*

The European TIDE/HEART study looks at AT from the perspective of its outcome, by saying that *..the ultimate objective of AT is to contribute to the effective enhancement of the lives of people with disabilities and elderly people, helping to overcome and solve their functional problems, reducing dependence on others, and contributing to the integration into their families and society...* It also suggests that *...Assistive technology cannot be considered as a specific type of technology in itself, but as the implementation of a particular, and generally well-known, technology (e.g. Electronics, telecommunications, informatics etc.) for a clearly defined application by people with disabilities..* By this sentence HEART means that not always AT coincides with a technological device specially developed for disabled persons (eg. special interfaces), but often results from the

assembly of consolidated technologies that are implemented according to the user needs.

While it is quite clear that AT yields enormous potential for the benefit of people with disability, it is not yet clear how to measure its impact on both the individual and society, so as to be able to make comparison between the impact of different kinds of technologies.

When investigating the issue of AT outcomes, a report of the European TIDE/CERTAIN Study (Loretsen and Hem, 1995) offered an interesting insight of the domains where AT has an impact with respect to the expectations of the individual: 1) the inner relations, 2) the activities of daily life, and 3) the outer relations:

1. Inner relations relate to self esteem, self confidence, coping and acceptance of disability. It reflects the individual state of comfort, satisfaction, safety, contentment. Pain, discomfort, anxiety, insecurity and destructive elements are factors that of course should be eliminated.
2. Activities of daily life includes all tasks/activities in all facets of life. These have to be identified by each individual user according to one's own preferences, priorities and values.
3. Outer relations concern social aspects, social integration and social networking, again defined on an individual basis according to one's own priorities.

The authors also suggest that the expectations of other actors should be investigated, namely 1) the family or primary network, 2) the professionals and 3) the community.

In the whole, this view looks interesting in the context of this papers, being it consistent with the relational definition of autonomy that is given in the previous chapter.

Some authors point out that AT might hide some risks and even restrain autonomy (Brunelles, 1992). Based on accounts of occupational therapists and of disabled people about the design, utilisation and perceptions of AT, Brunelles emphasises the dangers of looking at AT just as a compensatory technical object, without considering the project of life of the individual user. He support his comments with cases where aspects related to the return at home after discharge from hospital were underestimated, leading to failure of AT.

The public image of AT as offered by mass-media often reflects the level of disability awareness in the community. On the one hand, sometimes the assistive device is presented as negative symbol of the disabled person's confinement, putting emphasis on the impairment (medical view) and thus reducing the image of the disabled person to his/her limits. This image has been often used by associations working in the field of disability to raise emotions for improving fund raising (financial view). On the other hands, there are good example of AT (even in commercial advertisements) presented as a tool for

independence and relation, where users appear to be engaged in activities together with other non-disabled people, on an equal foot. Conveying a correct and positive image of AT yields a great educational value for the community, and can give a powerful contribution to public awareness and acceptance of disability.

1.2.3. Third keyword: Critical Factors

Success or failure of AT depends on several factors. There are factors related to the disabling impairment, to the end-user's situation, to the role of intermediaries, to the environment, to the attitude and knowledge of the surrounding helpers and professionals. The individual medical and psycho-social condition, the personal past experience in AT, the person's current expectations may generate a variety of perceptions of AT in relation to the problems to be solved.

Clarifying these processes is substantial to understand to what extent knowledge can contribute to empower end-users to reach the needed autonomy so as to make responsible, effective and useful choices. The objective of this study is to identify, classify and describe the body of AT knowledge to be transferred to the end-users: now, being the concept of *autonomy* so dependent on the individual, it is clear that the process of knowledge transfer should be tailored to the needs, personality and environment of each individual. The "critical factors" analysed in the following chapters are the keys to understanding how such a process can be customised.

The term "critical factors" refers to *all those aspects influencing the transfer of knowledge on Assistive Technology to the end-users*, and in turn influencing the ability of the person with a disability and/or the elderly to make informed, effective and satisfactory choices. There may be critical factors that have a negative influence, others that yield a positive influence, others that may act positively or negatively when cross-related with other critical factors. The adjective "critical" is not used as a synonym of "positive" or "negative"; it just means *deserving careful consideration*.

2. BRIDGING END-USERS AND TECHNOLOGY

2.1. THE USERS DEMAND

2.1.1. User involvement

In a report dealing with AT education of professionals, the TIDE/HEART study recommends that “...*The first characteristic of an European curriculum is **user focus**. User focus means that in all training programmes and courses in assistive technology, the ultimate objective is to enable the elderly and the people with disabilities to reach the optimum level of capability by, for instance, reducing the demands of the environment through assistive devices. User focus also means that all demands of different groups of disabled and elderly should be taken in account when planning training in assistive technology. Users should also participate in training programmes and courses giving lectures, and sharing their knowledge and experiences with the participants...*”(HEART E.2.1, 1994). As yet it seems that this seldom happens in current professional education programmes; however, the issue of user involvement is more and more taking shape in research findings and policy discussion. The above recommendation is one of the many examples of statements that point out ways to make such involvement concrete.

The HELIOS II thematic group 6 ("Elimination of technical barriers", in the Network of Social Integration and Independent Living") discussed extensively the role of technological aids in promoting autonomy. Several reports (HELIOS II, 1994, 1995, 1996) pointed out that the end-users should take active part in *all stages* of the ideal circuit they sought to identify, like manufacturing, marketing, distribution of information. They also stated that the involvement of users in the process should not be limited to technical aspects, it should also extend to educational, social, financial and legal aspects. However, they recognised that this cannot be done by simply having a random person with disabilities consulted, but requires that the users are *educated* to be active partners. Paramount to this purpose is to provide independent and objective information or advice on assistive technology, but also to increase one's awareness and consciousness about autonomy and AT. In other words information is substantial, but on condition that the person undertakes a personal process of change.

However, the user influence is an interactive process that requires not only the users prepared to do that. J.Wesemann (DG V and DG XIII, 1995) writes "*...there is often too little interaction between scientists and consumers. The development of prototypes must be tested with the help of the disabled people for whom they are meant, to make sure*

that the final products can be used properly". Consistent with this thought, one year later the *USERfit* methodology was published by the TIDE/USER project of the European Commission providing concrete models and tools for users involvement in products development. It greatly contributed to spread out the concept of *user centred design for AT* (Poulson et al., 1996).

Some years before, a proposal of L.A.Edwards (Edwards, 1992) appeared on the Internet in which he coined the expression *prosumer approach* from the two words *producer* and *consumer*, mainly referring to the production and utilisation of information and thoughts. He wanted to stress the need to spread a new way of thinking about the roles and relationships in the rehabilitation field: the right to self-determination of the disabled must also concern their participation in the entire rehabilitation process, including the use and the production of knowledge and products, and their involvement in the research projects themselves.

Again Line E the HEART study depicts the involvement of end-users in professionals educational curricula as "*...guest speaker or lecturer" for case studies and demonstrations. So the consumer's knowledge and experience should be utilised to make the technological solutions acceptable to consumers and tailored to their needs. Other professionals stress the involvement of consumers in training, like showing students how they use technologies, and the pros and cons of the technologies*" (HEART Line E.2.1., 1994).

Many other ideas can be found in literature about models of user involvement at various levels, like design of policies and programmes, feed-back methods embedded in products development of products, participation in the standardisation process. Looking at findings of a number of local pilot projects in the European Union, the HELIOS thematic Group observed that :

- the disabled and the elderly are able to draw the attention to problems that are often hidden to the eyes of professionals, so the contribution of experts with disabilities improves dramatically the process of identification of needs and requirements;
- the influence of users leads to improved standards;
- user involvement should constitute a systematic part of the rehabilitation process, in order to improve its effectiveness.

A closely related issue is the user involvement in service delivery of assistive technology, on which topic Line C (Service Delivery systems) of the HEART study (HEART C.5.1., 1994) worked out a number of recommendations:

- users are the best judges of products and services directed to them;
- a good service delivery system is designed in a way that empowers users to make their own choices;
- good service needs feedback and user involvement.

- the rights of disabled persons to access appropriate assistive technology should be ensured through adequate legislation and financial support schemes;
- financial resources should be allocated to facilitate users influence at various levels (committees, reference groups etc.);

In conclusion, as underlined by HELIOS II, three main keywords can be identified as component of user involvement: *choice, control and feed-back*.

Interesting indicators of the relevance of the user involvement issue can be drawn from studies on assistive technology abandonment. Low utilisation and early abandonment (abandonment before the normal technical life-cycle of the device) may suggest that the technology provided was poor or wrong, or for some reason resulted ineffective, useless or unsatisfactory for the client. In such a study carried out in the United States over a sample of 200 users (Phillips and Zhao, 1993), four factors were identified as the main reasons for abandonment of assistive technologies: 1) failure of providers to take consumer's opinions into account, 2) easy device procurement, 3) poor device performance and 4) changes in consumer needs or priorities.

These findings suggest that technology-related policies and services need to emphasise consumer involvement and understanding of long-term needs of consumers. If not, there is high risk that the needs of people are not properly met, and public funds are wasted.

2.1.2. Identification of the users' needs

A clear understanding of needs is the first step to start any user-focused process. Identifying user needs means searching for satisfied or unsatisfied needs, at both individual or collective level (Conte, 1984). To ensure that this is done appropriately in all relevant domains (lifestyle, products, services, initiatives etc.), a consistent approach should be found and methods should be designed.

It seems that the needs identification is often the weak point of several studies, which overcome this problem by simplistic assumptions (e.g. that a real need corresponds to the immediate personal perception of the need; or, conversely, a pre-defined table of needs that all people with disabilities are supposed to have).

A study done by DHDO, Développement des Hommes et Des Organisations (Conte, 1984) explored this issue, taking into account the differences among people with motor, visual or hearing impairments, and elderly people. The questions were about psychological approach, daily difficulties, limitations to autonomy, human resources available, expectations etc. It found that many surveys in the field lack attention to user needs and assumption made

by service planners often lack scientific ground. They also highlighted that needs of elderly people living in an institution appear quite different with respect to those living at home. As a background for a further study, CTNERHI (Observatoire Régional de Santé d'Ile de France and CTNERHI, 1985) carried out a survey in two French departments about the needs for assistive equipment for adult disabled people. The results were almost total absence of information about disabled people, their numbers, the nature of their disability and the related needs.

In another survey carried out in Norway (Lorentsen and Hem, 1995) through brainstorming sessions with users, family members, user organisations and professionals, the issue of correspondence between AT and the user needs was discussed on the basis of the participants' experience. Questions were asked like: "What are the critical factors in providing assistive technology?", "What characterises a good solution and a good provision process?", "What expectations do you have concerning an assistive technology solution?" etc... It was found that the outcome of assistive technology depends not only on factors related to the individual disability, but also on the performance of the assistive devices, on the processes and the methods through which the national service delivery system relate to individual users, on the coherence of AT with the overall habilitation and rehabilitation strategies. So fixed tables like *disability -> need -> solution* cannot be established a priori, all the above factors should be considered case by case (depending on the person and social setting) without any implicit hierarchy.

Only recently the issue of users-needs analysis with respect to AT was raised in rehabilitation science studies, especially in conjunction with AT outcome analysis. Instruments have been designed like e.g. the "Matching Persons and Technology" (Scherer 1994) for assisting technical aids advisers to better identify (in partnership with their client) the areas of individual needs that could be solved through AT, and the individual predisposition to adopt technological solutions.

Such issue should be central in the context of the EUSTAT project, being it quite obvious that any initiative of end-users education should respond primarily to *their* needs, and not to the needs of other actors in the field.

2.1.3. Assessment of user needs

In current rehabilitation practice, especially in occupational therapy, there are several approaches to the assessment of clients' needs with respect to daily life functioning. Several instruments have been developed to measure the outcomes of rehabilitation processes, although none of them still seem to be sufficiently responsive to AT (Andrich and Ferrario, 1996). Such assessment instruments can help a

lot to explore the extension of needs, but they often tell little about the individual perception, priority, dynamics and emergence of needs. One need that is such for the majority of people may be not felt as a need by an individual. In other words each need is *weighted* differently by various individuals.

For the EUSTAT purpose it seems important to distinguish between two possible approaches in the analysis of end-users' needs. The first can be defined as an *external observer* analysis, the second as an *internal/systemic* analysis. The choice of either approach yields important consequences for the design of educational initiatives for end-users.

The *first approach* is based on "inventories" or "compendia" of needs, designed on the basis of studies carried out over populations of people with disabilities. In this manner problems or needs are classified and thus can be treated as objective (and sometimes measurable) data. Classifications exist with respect to the impairment, disability and handicap dimensions (see WHO definition in chapter 1.2.1) as well to other medical or psychological dimensions (rehabilitation medicine instruments). Following this approach, the *handicap* (or *social disadvantage*) dimension seems the most useful for the EUSTAT purpose, since in the end-user view it is clearly related to technological support. Since handicap can be seen as generated by:

- disturbance of the ability to act in the environment (dependence or inability to carry out a certain number of fundamental acts, due to impairments or disability, and not due to choice);
- a physical or human environment generating difficulties or impossibilities for disabled or elderly people to carry out activities related to those fundamental needs;
- this involves thinking about:
- means of compensation that take charge of dependence (human help) or lessen it (technical devices);
- means of adapting and humanising the environment through better design, technical standards and normative conceptions.

Although useful as a conceptual framework and for providing an overall picture of the needs, the classificatory approach does not seem sufficient for the understanding of the *individual* needs. Every person is different from the other, so the *standard disabled person* or the *standard elderly* having a *standard need* as felt by the majority of their peers does not exist anywhere. One indicator of that is the different response by each person to the same problem, in terms of motivation to act or resistance to change.

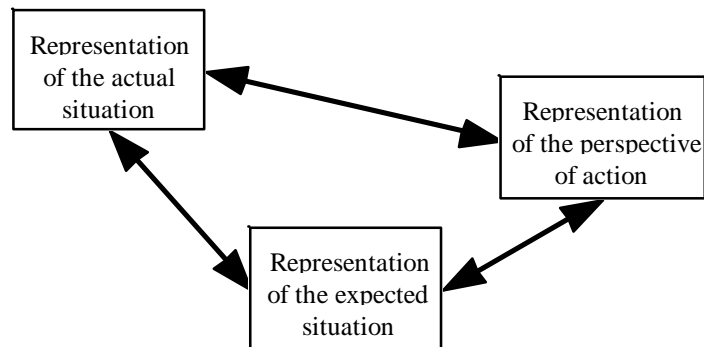
For the EUSTAT objectives the *second approach* is preferred. This does not attempt to assess needs by external observation. It relies on the supposed ability of the individual (and the system around him or her) to define and elaborate them. It is based on a systemic vision, where the system composed of the person and (where applicable) his

or her primary network (spouse, family etc.) is helped to identify, express and weight needs (Hierbert and Smallwood, 1987). Such approach is often used in counselling practice, but seems also interesting in an educational context (training end-users to express needs and set goals). Details are given below.

2.1.4. The expression of needs

According to a constructivist view, the need (in terms of something to be satisfied or a problem to be solved) is not placed in the nature, as an objective attribute of the world around the person. It is an individual or social construction of reality. Something is perceived as a need when a gap is felt between the present situation and a possible “better” situation, and there is a feeling that some actions could be done to move towards that “better” status.

The expression of a need is therefore a multidimensional event that integrates three distinct, but closely bound, perceptual data: the representation of a present situation, the representation of an expected situation, and a perspective of action (Burgeois, 1991):

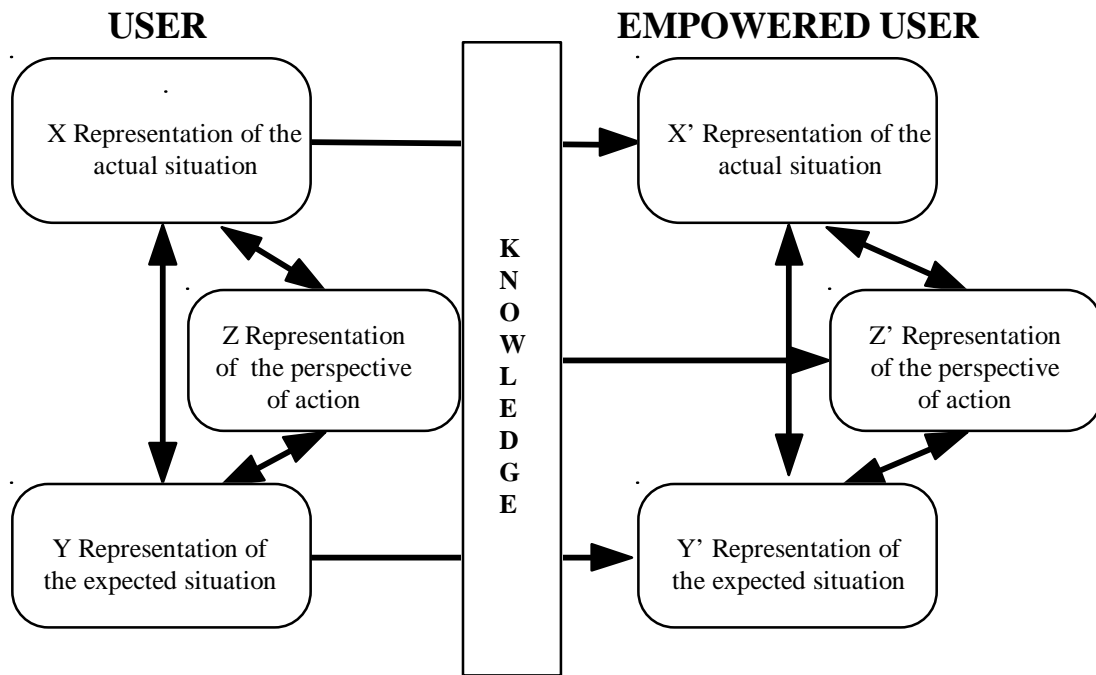


Each of the above three “poles” interact with each other. The perception of the present situation is influenced by the aspirations and the expectations of which the individual is the holder. Inversely, his or her aspirations are conditioned extensively by the life experiences the individual has now. The perspective of action concerns the ideas on the means that can transform the present situation into the expected one: these are substantially determined by his or her representation of the present situation and of the expected situation. Despite such three poles are always interacting, this doesn't mean that each of these representations is necessarily conscious or explicit nor that it has to be necessarily elaborated at the same time. It is sufficient that at least one of the three poles is salient in the perceptual field.

For example, one individual may at first express a need solely in terms of a problem to be solved, even though, at that time, he/she is unable to express the aspirations which are behind his/her mental construction

of the present reality, nor yields he/she any ideas of means of action that meet such unexpressed aspirations. Similarly, some persons may express a need at first under the form of desires, of expectations, of aspirations to achieve, even if, at that time, they do not make any analysis of the present situation and have just some vague intuition that something could be done. In other cases the salient pole could at first be only a perspective of action without discerning what the present situation is like nor the achievements that can be expected.

In this perspective, the analysis of needs is nothing else than a process which leads the end-user to solve the three poles in interaction. At each point in time, the salient pole(s) represents the “entrance door” of the needs analysis. According to this approach, the transfer of knowledge should not be a mere transmission of notions, but an injection of ability to 1) better clarify each of the three poles, and 2) better solve their interaction. Under this assumption it is possible to say that it facilitates *empowerment*.



Information and knowledge help each user to produce new mental constructions and therefore new expressions of needs. The clarification of the three poles will thus culminate in a point when the user feels he or she has produced the most applicable representations. So the expression of needs is person-specific, is different from one user to another; different users with different psychological attitudes, life experience, social status and contexts may feel comfortable with quite different choices with respect to the same situation they may encounter in daily life, at school, at work, in social relationship.

Knowledge can be injected from the outside through a lot of means: information on the mass-media, visiting an exhibition, advice from a professional or by a peer, informal information from others, role modelling (seeing other people with disabilities living a independent and resourceful life), etc. The EUSTAT study will look at *formal education* as a means to transfer knowledge.

2.1.5. Role of the primary network around the individual

However, knowledge can be generated also within the primary network. It should be observed that very often the members of the primary network have an influence and a role in the process of clarification of the three poles. There are aspects of the individual life project that can be hardly separated from the family life project; for instance, there may be a range of expectations originating from the relationship with the spouse, who may have in turn other needs and aspiration which are then shared with the partner. The introduction of AT in a family has an impact at various levels and (maybe with the exception of strictly body-related technology) it may require personal changes in other family members. It may also require modifications in the organisation of personal assistance, and thus a change in attitudes and habits of personal assistants. So the analysis of the end-users' needs cannot ignore the point of view of the helpers, and their influence in the expression of needs.

Again resorting to a systemic view, all the “system” composed of the individual and his or her primary network should be looked at in this analysis. A kind of “subsidiarity principle” could be defined: since such “system” is supposed to have internal resources to find solutions to its needs and problems, external actions should aim at 1) empower it to better understand needs, set goals, make projects, take good decisions, and 2) set up the societal conditions that allow such decisions to be actually implemented.

Internal to the system, the role and the weight of the various members with respect to disability problems and assistive technology is different from one case to another, and can even vary in the time. There are cases in which the individual with disability is in fact the only and unique person dealing with such topics, with no influence from others; there are cases where he or she, on own choice, shares these aspects of life with others; cases where a wider group is involved; and even cases where the real end-users of AT are in fact the helpers.

The term “helpers” refers to those members of the network who provide the practical help in assistance or in carrying out the activities of daily life. Depending on case these people can be :

- family members, like parents, partner, children, etc.;
- friends: who come occasionally or regularly to help;
- personal assistant: persons from the outside, paid for this help.

In other words, the clarification of the poles is a circular process by which the user reviews his/her representation of needs, sometimes together with other members of his/her network; and this clarification can be enhanced by formal or informal information.

2.2. THE MARKET OFFER

2.2.1. Standardisation

As a response to their demand, users expect a market able to provide products and services that are designed to properly meet their real needs and desires. Meeting the needs of people with disabilities and the elderly is exactly the mission of assistive technology: *“AT is defined by its consumer base : elderly and disabled people. The emphasis on the needs of consumers, rather than the push of a particular technology, makes it one of the user-driven or market-oriented industries of the future. It addresses the technology needs of elderly and disabled people, in particular, the need and desire to maintain autonomous life. There are two main themes; enabling access to new technologies (and the opportunities for work this provides to disabled people) and harnessing new technologies to fulfil their need in everyday life. Rehabilitation technology incorporates a wide range of technological building blocks including, information technology, telecommunications and control technologies, as well as services based on these”* (TIDE Information Package, April 1993)²

Transforming users’ needs into design specifications is the first challenge of any industrial development undertaking, and has to be done whenever starting the design of any new product or service. However it is common to not re-invent the wheel everytime but to attempt to set design specification as far as possible on a wider level so as to accommodate a broader range of technologies and ensure compatibility between them. Such a process is called *standardisation*.

Standardisation is a post-political procedure which operates both formally at national (national standardisation Bodies), European (CEN, CENELEC etc.) and world (ISO, IEC) level, and informally on the independent initiative of Industry (de-facto standards). An accepted standard has enormous influence on the conception, the design, the production, the construction, the market and the use of a service, good and infrastructure covered by it. Many standards are adopted as laws, in any case they have great influence on the elaboration of measures and directives. For instance, some AT falls within the scope of the EC

² Recently the European Commission adopted the word "Assistive technology" instead of the previous word "Rehabilitation technology". The reason was to give a less medical-oriented and much broader definition in line with current thoughts, as of "technology to enhance the quality of life of disabled an elderly". Therefore in this quotation “rehabilitation technology” reads as “assistive technology”.

Medical Devices Directive 93/42, and this is having an impact on the safety of devices, on the market offer, on national policy in some Countries.

To improve the correspondence of products and services to the user requirements, first of all it is important that these are properly taken into account in the standardisation process. However, the lack of awareness of standardisation issues among users is one of the obstacles to their influence. Line A of the HEART study (HEART 1994) stressed the need for a massive information effort because of the great lack of knowledge and information about standardisation work among user organisations. The study recommended that people with disabilities should be active in standardisation work, both directly (by participating in working groups, national groups, committees) and indirectly (by being consulted by those who design standards), and that some education should be provided to enable them to draw design recommendations from their experience of AT users.

During its 3-years work, the HELIOS II thematic group n.6 (HELIOS 1996) observed the impact of the ISO 9999 / EN 29999 standard (Classification of technical aids), and found that it was a good tool for promoting a uniform approach to AT in Europe. Most AT covered by such a standard are currently known, listed, distributed and available in most member States. The HANDYNET programme (again part of the Helios programme) further developed the classificatory aspects and produced a database based on information collected in all Countries by National Reference centres. The Handynet Cd Rom was adopted as information tool by many technical aids information and advice centres, thus facilitating familiarity and knowledge of AT all over Europe. However, the thematic group also remarked that not always the technical aids available on the market correspond to the specific needs of a disabled person; very often they require adaptations. Sometimes users, rehabilitation professionals or user organisations are capable to design new devices from scratch, if nothing similar already exists on the market; unfortunately, generally these one-off adaptations cannot be found in databases such as HANDYNET. Likewise, a lack of information exists about new leading-edge technology (advanced communication devices, domotics, robotics etc..) because they have come on the market quite recently, are constantly changing and are not dealt with by existing standards.

Finally, the study concluded that standardisation should proceed along three main lines:

- technical equipment: their safety, quality, performance/ functionality, compatibility, durability and accessibility. Standards should be based on human needs, not on pure market considerations. New technologies should not build new barriers for disabled or older people.
- universal design: services and products should not be exclusively designed for the disabled and the elderly, they should be the same as

for other people. Indeed, producing common products and services would encourage the integration of disabled or elderly persons, and through scale economy would reduce price (which is still one of the biggest problems in the AT market). Standardisation could ensure that a wider audience be accommodated, and increase industrial competition that in turn would be beneficial to the users.

- the terminology: a real need exists for widely accepted definitions that have a common meaning throughout all the actors of such a multidisciplinary sector. A glossary, a common language and a set of definitions in the field of AT would also facilitate the transfer of knowledge and ease the coherence of the European single market.

2.2.2. Market characteristics and failures

The AT market is quite recent and constantly changing. The attitude of consumers has been changing following the social evolution of the image of disability and ageing. Users are becoming more and more aware of their importance as a group of people of potential economic interest. They are more aware they are entitled to express a critical approach and to make choices in the products and services on the market (DG V and DG XIII, 1994).

However, the AT market is not driven, as it would happen for most consumer goods, by a direct relation between the consumer and the supplier. In most cases a number of intermediaries act in between.

A first level of intermediation may originate from members of the person's primary network. As discussed before, the disability of a member has often a consequence within the network. People who live with the individual elderly or disabled person may encourage or discourage the expression of a need, thus influencing in either way the priorities for the life ahead. This is understandable, because the family members and the helpers of the disabled persons are also themselves users of AT. However, it is not always obvious that the expressed demand corresponds exactly to the disabled person's demand, it may be a *filtered* demand. Of course all actors in the network may have legitimate demands, but it is important to understand *who* is asking for what.

The second level of intermediation is due to the fact that in most countries the AT market is driven by one or more *public service delivery systems*, created in order to make technology accessible to people who could not afford the expenses otherwise. The facilities and distribution of these services are variable and the information is often difficult to find and to interpret. Line C of the TIDE/HEART Study carried out a detailed analysis of service delivery systems in 16 Countries, and the survey it produced is still the most complete resource that provides an insight on each of them (HEART Line C, 1994).

It is apparent that a centralised provision service unbalances the market, in that a small number of big public purchasers takes the place of a widespread population of individual purchasers. But it is also true, as demonstrated by some studies (Lorentsen and Hem, 1995), that it increases the outreach of assistive technology to people in need of that. In other words, there is an hidden demand that comes to light when stimulated. For instance, in such a study a significant difference was detected in a Norwegian county (Telemark) between the number of AT users before and after the establishment of a local technical aids centre. Even though this gives no indication on the quality of service provision and the utility of the solutions provided, it highlights the positive consequences of public services in meeting user demands.

Intermediation can be seen as a double-edged weapon. Somebody argues that qualified professional advice, information and education can be of little help if the user has no direct control on funding, and especially if the final decision on AT lies in the hands of other professionals. In some Countries, user organisations describe sometimes the professional intervention as an obstacle in this process, suspecting a conflict of interest: the argument is that, being the professionals hired directly by the (public or private) funding agencies, they are induced to favour the budgetary policy of their employer rather than the users' interest. However, there is a great variety of models on which intermediation policies are based. The above mentioned report of HEART / Line C gives plenty of examples of good practice in AT provision that is respectful of the freedom of choice on the user, with AT advisers playing the role of counsellors and facilitators. In many cases this takes the shape of a separation between the Bodies who inform and give advice and those who authorise the funding; in some other cases there are fixed budgets for the individual project, within which the user is free to take any decision. Conversely, there are regions where the level of service provision is very poor. In other words, despite the situation is far from optimal in many areas of Europe, it is not necessary to re-invent the wheel because models of action already exist.

In designing educational initiatives for the end-users it is important to keep into account the above aspects. If we wish the users to become active partners in the choice of AT, one thing to do is to make them less dependent. Two levels of dependence exist: one is technical, the other financial.

Technical dependence concerns the fact that the disabled person must adapt his needs to those of the service provider, instead of having a service shaped to his needs. One recurring issue is that very often the service provider takes care only of AT recognised as "essential", while AT that does not fall within such category, although essential for the user, is systematically forgotten (e.g. in Belgium electric wheelchairs is foreseen only for persons who need it for the job or for going to

school; if this isn't the case, the person gets more or less the funding for the simplest model of manual wheelchair).

Financial dependence is bound to the fact that the AT may be very expensive (especially if considering also personalisation and maintenance) and thus, for a majority of users, not affordable. Disabled people typically are not USD millionaires.

An interesting model advocated by several user organisations that follow the "Independent Living" philosophy is the so-called *direct payment scheme*, which terms indicated legally guaranteed income supplements that are provided to people with disabilities to cover the extra costs of living incurred on account of the need for assistive devices or personal assistance. Instead of passively receiving services, the individual user is given the money by which he or she will buy them. With money in their hands, they can buy services from the provider of their choice, and have the most direct control over service quality. Thus direct payments empower the users while establishing a competition between services to be played at cost/quality level. Of course it requires autonomous, informed and responsible users. This model is being experimented in some places.

Whatever the service delivery model, a problem that is always present is the fact that financial resources are not unlimited. That claims for cost effective approaches, both in term of products and of service delivery organisations, and consequently raises the issue of how to measure costs and outcomes: *"There is a need to provide objective evidence through well-documented investigations to political decision-makers, on the effect of providing assistive technology services, and to compare the results of these interventions with other services, -for the individual persons and for the society. When the demand for care is increasing, while the available economical resources are limited, it is important to provide evidence as to what are cost-effective strategies, and what is giving the best quality of life outcomes. Assessment studies, tailored to the field of AT constitute valuable tools for such studies"* (Lorentsen and Hem, 1995).

In conclusion: the establishment of the European a single market has opened new horizons also for assistive technology, and consequently new opportunities for elderly and disabled people throughout the Union. However, it seems that the exploitation of such opportunities greatly depends on the influence and decision power of the end-users. To this end, actions are needed to reduce technical and financial dependence. End-users education is one of them. In the design of educational initiatives, service delivery aspects should be given appropriate place.

2.2.3. Legislation and policy aspects

Technical aids funding and provision should be seen as part of wider policies on life support, social integration and participation of elderly and people with disability in society. Each Country in the European Union has its own legislation, sometimes very different from each other. Concerning AT, in some Country the person is entitled to funding under very specific and restrictive criteria, in other Countries a more open approach is adopted. Concerning environmental accessibility, different standards exist although some basic principles are everywhere enforced by law; a common problem is the control of their correct implementation.

Like standardisation, the design of disability policies and legislation also requires the active participation of users. The HELIOS thematic group n.8 (Political and technical conditions for transport adaptation, Helios 1995) insisted that any strategy aimed at eliminating barriers will be successful if it includes active and permanent participation of disabled persons or of their representatives. The thematic group 13 of HELIOS (Strategies for the promotion of the integration politics, Helios 1995) focused on the value of advisory councils, working at local level. According to this group, "these councils can contribute in many ways to the elimination of technical barriers, for example by information and awareness-raising; by promoting legislation, standardisation, common definitions and good practice" (Helios, 1995).

2.3. TRANSFERRING KNOWLEDGE TO THE USERS

2.3.1. Knowledge as a tool for empowerment

For the EUSTAT purposes, education is a tool of a person's development in a double dimension: growth of formal and/or technical knowledge, and acquisition of behavioural competence. This trend is also consistent with the fact that the old opposition between theory and practice has been largely abandoned not only in the philosophical world, but also in the pedagogical work.

Furthermore, since end-users' empowerment has been described as a matter of technology as well as social and individual attitudes, the project will maintain both a technological and a social orientation. This remark has been already underlined by HEART project - Line E on rehabilitation professionals and AT, but it is also a good statement for helpers and trainers.

To establish a model of education for EUSTAT, reference must be made to the most authoritative international definitions. Education has been in fact defined as "the total processes developing human ability

and behaviour” (International Dictionary of Education), and, according to UNESCO, as “organised and sustained instruction designed to communicate a combination of knowledge, skills and understanding valuable for all the activities of life”.

The Edith Cresson’s “White Paper on Education and Training”, gave great impulse to actions and research in this field. It has especially stressed that by investing in immaterial and human resources, global competitiveness and development of employment will be increased. Education and training will also become the most important vectors for extending feelings of identification, belonging, social promotion and personal development (Cresson 1996).

The theory of educational sciences has recently made a differentiation between the two main routes for content and knowledge transmission, that will be identified in this study as *teaching* and *training*.

The first one - *teaching* - is related to usual teaching activities (lessons, seminars, courses, ...), which take place in typical contexts and make use of well-known tools (blackboard, computer presentation, overhead, ...) and in which a certain relationship between a teacher and a group of learners is recognisable.

The second one - *training* - can have a lot of meanings, from the vocational training to the drill-and-practice activities. It has acquired the special meaning when it has been introduced for organisational change, because they have been recognised as the most important factors of change: for the individual, for the society, for the industry and the working team management. This kind of training makes more use of group work techniques, is focus and client oriented, and puts a strong accent on the contextual and organisational aspects in which the educational activity takes place.

The kind of education which EUSTAT is interested in can take advantage of studies on education and training, because the project is particularly addressed to change; consequently, EUSTAT is interested in finding and describing the conditions that can establish the best situation for that change. We will use the word *education* in its more comprehensive meaning, maintaining when necessary the difference between teaching and training.

A last consideration must be done when setting up a model of education for the empowerment of persons with disabilities. We cannot forget Finkelstein’s social analysis (see chapter 1.2.1.). Even if EUSTAT is situated and is working within his “third phase”, that of the move towards independence, we must be aware that “every aspect of the life of a person who is disabled has its counterpart in a profession”. Trainers, and training organisations, must be careful that their own action is not creating again an unbalanced situation, where they feel like being the “professionals who empower the client”.

The following aspects must be taken into account when organising any educational activity in the field of assisting the end-users to empower themselves to AT choice and use:

- the type of process in which training and/or education are actually transferred;
- pedagogical issues;
- the relationships among the actors;
- the kinds of knowledge involved in AT education.

2.3.2. Processes of knowledge transfer

Five different processes have been identified in the knowledge transfer in the field of AT: counselling, training, teaching, information, awareness campaigns.

1. *Counselling* can be defined as the process through which a person, on the basis of his/her professional expertise (professional counselling) or own personal experience of a similar situation (peer counselling), helps the individual end-user to make choices and take initiatives by giving information, helping to better understand one's own situation, favouring motivation. Professional counselling is now a well-studied technique in the field of psychology where the relationship between the actors is established as well as the objectives and the subjects' roles.
2. *Training* is first the process through which a trainer teaches an individual trainee or a group of trainees practical knowledge about specific categories of Assistive Technology. Training also has a second and more complex meaning, which concerns the special kind of educational activities that can be organised by an industry or a business in order to modify its employees' competence and attitudes towards any aspect of work. Some of the educational activities set up by organisations in the field of disability to help or favour the participants' empowerment towards autonomy can have the character of a training.
3. *Teaching* is the process through which a higher level of understanding, competence and problem-solving ability is provided to a group of users. Teaching activities may be less or more complex in content, extent, duration, organisation and may be carried out through lessons, seminars, conferences, courses, ...
As explained above, within the EUSTAT study we will refer to the two processes with the more comprehensive term *education*, except when the situation needs a more detailed reference.
4. *Information* is the process through which notions pertaining to the field are given to users. Information is generally addressed to a large audience aiming at increasing general competence.

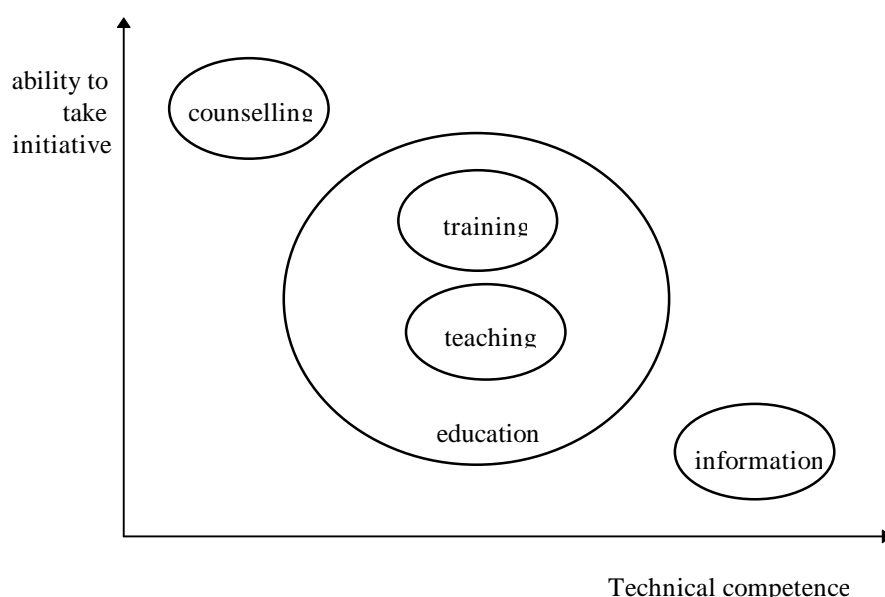
5. *Awareness campaign* is the process through which attention is raised on specific issues with the intention of shaping the attitude towards.

For effective empowerment all five processes above should take place. AT users (persons with disabilities, elderly and their helpers) may need education, training, information or counselling at different times and for different purposes.

Awareness campaigns, although important, will be not considered further in the EUSTAT study. It can be seen as a background process addresses towards large and undetermined population rather than the individual end-users; awareness campaigns may be needed to remove prejudice or bring to light neglected opportunities to pave the way for other kinds of empowerment initiatives.

Concerning their main aim, any of the remaining four processes (*counselling, training, teaching, information*) can be “positioned” differently with regard to the stress it puts on supporting initiatives or providing technical competence to the end-users.

In the following diagram the four processes are illustrated as regards their main objective. The two opposite poles are occupied by information and counselling. Information plays a great role in the notions and competence dissemination and isn’t directly addressed to raising the individual’s ability to take initiative; counselling is a well defined set of actions aiming at changing something in a person’s life. Education is here the mid process, with a balanced interest in both objectives (raising competence and initiative), having training a little stronger accent towards initiative, because of its more practical and concrete structure (basis).



2.3.3. Pedagogical issues

Educational activities are based upon different ideas about learning, therefore about teaching, training and knowledge transfer; the choice of the kind and the structure of the educational activities are then strictly related to pedagogical issues, which give also the correct framework to discuss and evaluate them.

Pedagogical aspects are involved in all the four considered processes. For example, in the case of counselling, the pedagogical tension (e.g., the need to “teach” something about AT) is subjected to the particular psychological setting of counselling, where the attention focuses on knowing and finding the best way to improve the situation of the person/s present. On the other hand, a pedagogical issue is recognisable in information activities too. But they deal mainly with communication theory and practice. In fact, attention here is mostly related to increasing a general, broad competence, in order to build good and understandable messages. In the case of awareness campaigns, the major suggestions come from mass-media communication and advertisement techniques, because the accent here is put on obtaining a change in general attitudes, and the message must be rapid, effective and even a little shocking, conflicting with previous opinions and/or prejudices.

EUSTAT is more interested in *educational* activities (training and teaching), and the science of pedagogy is strictly related to them. In the following we chose to refer only to the recent pedagogical literature, which produced the most interesting practical applications for group dynamics and group learning. Educational methodologies, teaching styles, tools chosen for teaching and training, which together form the “styles of knowledge transfer”, are strictly connected to each other and to the theoretical framework used. Here we can only cite some of the learning and teaching methodologies actually used in the educational field and education, trying to refer them to the nearest theoretical framework. Some of these methods have been well described in the handbook “*USERfit*” (Poulson et al., 1996) produced by the TIDE European programme, on user-centred design for Assistive Technology.

Three theoretical frameworks are still used in contemporary education and they are closely connected with the correspondent theories of learning: the behavioural, the cognitive and the constructivist approach.

The first *behavioural approach* has been abandoned, but the idea that learning can proceed from well-formed and individualised exercises is still productive; according to this approach, the learner plays the role of a recipient of information to be assembled in his/her mind. For example, most educational software is based on this approach. In any case, this approach has proved effective especially when practical issues must be learned, and when a person needs to acquire some automatic behavioural responses. Examples of styles of knowledge transfer related to the

behavioural approach are: tutoring, mentoring, coaching, lecturing, instrumental team learning, hands-on sessions, videotraining, etc.

The *cognitive approach* relies upon a totally different idea of the learner and learning; nevertheless in its first conception little attention was given to education and teaching, while the researchers in this field concentrate more on designing persuasive flow-charts of the human being's neurological functions (language, memory, reading/writing, etc.). The most recent development, however, in the direction of the so-called "meta-cognitivism", directly confronts educational issues, and introduces a great number of methodologies and techniques for teaching and learning that are widely used today in education: for example, the design and use of charts and networks (e.g., the semantic networks), the matching technique, the problem solving technique, the project methodology, etc. Examples of styles of knowledge transfer related to the cognitive approach are: project work, action centred programmes, group project work, brain storming, chalk and talk, real life projects, etc.

The *constructivist approach* has had close ties with learning processes from the outset; it is in fact based on the idea that from birth everyone builds his/her own learning, as a protagonist of learning. The accent on the environmental and social occasions of learning is strong, and consequently the methodologies and the techniques derived are strictly related to the added value of learning in a group, by confronting and putting together different ideas, skills, points of view. For example, constructivist methodologies of training and education are the circle of learning, open and flexible learning; and, more recently, distance learning which relies upon the use of Internet as a medium of education for people who are far apart but involved in the same field of study. The constructivist approach was born within a more general theory, well developed in sciences, which is the systemic framework, where any element of a system is considered as strictly connected to the other, to be analysed and modified together. The study of communication in families, as well as in big organisations, and the use of a kind of Socratic method of "maieutics" to provoke changes within them, are the most important and basic examples of training and educational methodologies related to the systemic approach. Examples of styles of knowledge transfer related to the constructivist approach are: business games, role-playing, simulation, distance learning, open learning, group work, quality circles, etc.

The historical progression from the behavioural to the constructivist approach corresponds to a change in the main focus of training and education (Stiefel, 1982). In the '50s attention was especially on teaching: emphasis is on the content to be transmitted, the predominant teaching methodology was that of topical seminars. In the '60s accent moved to learning, the effectiveness of teaching methodologies; the predominant methodology was then the organisation of seminars based upon "active teaching methods". According to the same author, in the '70s and in the '80s two different trends are recognisable: first, an orientation towards problem solving (what parts of the problem can be changed by training, what parts need other recovery measures?); second an orientation towards "transfer", i.e. giving the trainee the right support to obtain the maximum transfer of knowledge. Only in the last two phases does training acquire the modern meaning of "training to change behaviours".

After the recent elimination of the main distinctions between the internal logic of the various methods, most models and methodologies which have been identified and classified are now used in a sort of

meta-method. The role of method is now only to act as a medium to obtain the real scope, that is the strategic integration of training.

In one of his works, Lesne (Lesne, 1977) suggests three kinds of pedagogical transmission:

- transmissive type (normative orientation);
- incitative type (personal orientation);
- appropriative type (centred on social inclusion).

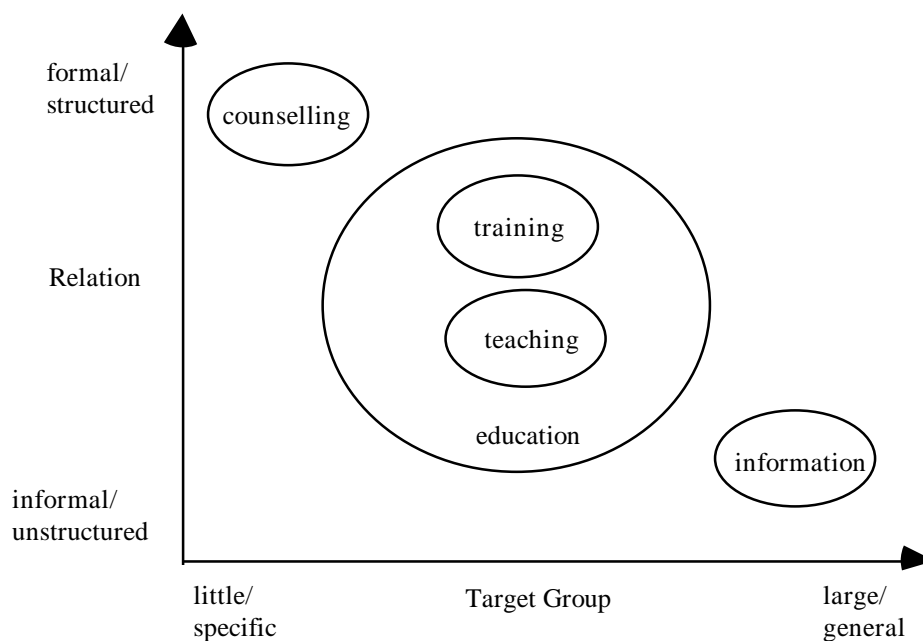
Educational activities which are limited to the transmission of knowledge of a theoretical or procedural order, are analogous to the *transmissive* type, where the instructor, lecturer, or specialist transfers some models of thinking and some previous structures into action. *Incitative* education has a personal orientation, operates mainly at the level of the individual's intentions, motivations, and arrangements, trying to develop a personalised way to transmit knowledge. The *appropriative* transmission in education is centred on social inclusion, built for developing the individuals' ability to modify the condition of exercising his own daily activities.

2.3.4. Interaction between actors

Relationships in education are strongly dependent on the educational process in which the actors are working.

While the main relationship between the professional (or the peer counsellor) and the end-user is formally defined and structured, in any information activity this relationship is more informal and less dependent on specific rules. The four processes also differ in the kind and the number of persons they are mainly addressed to: while generally the counselling process is addressed to a single specific person, information can be addressed to a large and undetermined public. For instance, an educational process can be designed to meet the educational needs of a very specific group (for example, a small group of young paraplegics) or broad audience (for example, a larger group of people with different disabilities, and their helpers).

In the following diagram the four processes are positioned with regard to two parameters: relationship and target group.



EUSTAT aims at studying particular relationships established in *education* (both training and teaching). Thinking back to what has already been presented in paragraph 2.3.2, the relationship in the *counselling* process is a well-established and structured one, with more reference to the psychological than to the pedagogical setting, because the real expected change of a specific person, with his/her limits and possibilities must be taken into account. So, the counsellor cannot be viewed as a teacher, but rather as a caretaker, a support person, sometimes as a therapist. Analogously, the relationship in the *information* process is informal, not focusing on the individual's life but rather addressed to a general public, so built more on content than on the relation to the user.

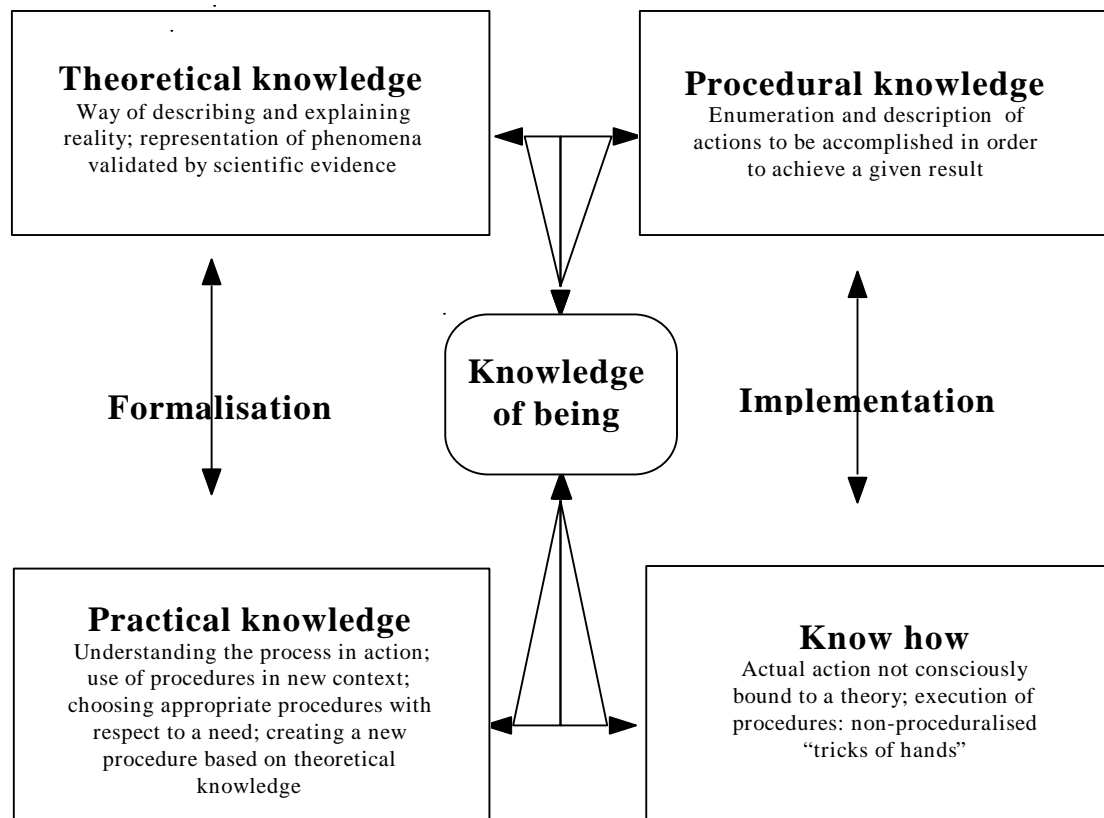
Also in the case of *awareness campaigns* (not shown in the diagram), the user is indistinct and large even if the relationship is really structured on advertisement and mass-media communication techniques: the aim is to produce a feeling of uncertainty - to shake up his way of thinking. But the single user is not known, while those designing awareness campaigns do know common habits and prejudices very well.

Relationships between the actors of education are related, like methodologies and tools, to the theoretical approach they refer to. Following the evolution line we described in paragraph 2.3.3., the relationship between *trainer* and *trainee*, teacher and learner, goes from the idea of the trainer as a coach, who constantly gives the right "bit" of information to be absorbed, using positive and negative reinforcement to assure learning (behavioural approach). Then this relationship evolves to the idea of the trainer as a maker of well-formed learning settings, in which problem solving, cognitive conflict and methods of graphic representation play a substantial role (cognitive

approach). Third, it presents a more meta-cognitive idea of the trainer as a moderator-supporter-facilitator of a discussion. Finally, the most complex constructivist idea of the trainer as a “maieutics”, who through his/her work enables the group of trainees to find the solution in themselves individually.

2.3.5. Types of knowledge

Before going into the transfer of knowledge on AT, a distinction must be made between different kinds of knowledge. These are: theoretical knowledge, procedural knowledge, practical knowledge, and know-how (Malglaive 1990).



Malglaive, 1990

The *cognitive order* is represented by the theoretical and procedural types of knowledge which allow understanding and control of the sequence of an action, or the use of an object or a tool. They are acquired essentially through symbolic means (reading, courses, conferences, etc.). The *practical order* is represented by the practical knowledge and the know-how. They concern “how to do it”, the concrete activities of manipulation of an object. They are acquired by reproduction-experimentation, trial and error.

To be exhaustive another kind of knowledge should be also considered, the so-called *knowledge of being*, which gives personal meaning to the other forms of knowledge: everybody applies his/her own sensitivity to his/her experience and environment. However, this lies behind the other four, relates with inner dimensions of the individual and will be not further discussed here.

This model is similar to the approach proposed by Janice Light for Augmentative and Alternative Communication (AAC). She describes (Light, 1989) four areas of competence required for successful use of AAC devices: 1) operational, 2) linguistic, 3) social and 4) strategic. These categories correspond to the four types of knowledge here listed (practical, theoretical, know-how and procedural respectively). The author insists on the integration of these four types of competence. She writes: “AAC users must learn linguistic, operational, social and strategic skills, but they must also learn to integrate these skills. In fact, learning to smoothly orchestrate the skills in all these areas may be the most difficult challenge in the development of communicative competence for AAC users”.

Two examples may help to clarify these concept. John is a disabled person; he has been driving an electric wheelchair for more than twenty years. So he has certainly some “hand skills”, and "effective tricks" by which he manages to obtain a satisfactory level of comfort: this is his *know-how*. Some *procedural knowledge* exists however for John: instructions for use of the wheelchair supplied by the maker, technical handbooks, safety notice, etc., but he doesn't necessarily have the *theoretical knowledge* to deal with technicalities: understanding how the batteries, the electronic control, the motor etc. work. Charles is a technician; he knows the engineering aspects of wheelchairs so he has the *theoretical knowledge*. He also knows John's practical requirements related to the wheelchair and his special needs, so he has a *practical knowledge* too. Finally, he has *procedural knowledge* available (technical manual, standard procedure in case of failure or defect ...).

In other words, a person can be knowledgeable about a subject without necessarily managing all the four types of knowledge. Nevertheless, any action of transferring knowledge to the end-user should consider the above dimensions and try to establish an effective integration among them.

2.3.6. Key points in AT education

Even if within EUSTAT development it is too early to establish a training model, some suggestions can be outlined for later contributions (critical factors, collection of existing experiments and methods, ...).

It has been stated that the educational process is not simply an action responding to a person's already identified needs. In the users' empowerment diagram (see 2.1.4.), it has been showed as one of the main tasks of an educational process is precisely the needs clarification with a regular cross reference between these needs and AT resources as means of satisfaction. This relationship is never automatic, but all the available adaptations must be taken into account.

According to EUSTAT approach, which is user-centred and system-centred, we would like to remind that the trainer can be viewed as an accompanying person who lets the end-user show and empower his/her own abilities, personal knowledge, unusual skills, in short his/her personality. In this sense, the role of the trainer is nearer to that of the counsellor (peer or professional): to promote and facilitate personal growth rather than to exert a position of expertise. In fact, being a facilitator of personal growth either in an educational process or in a counselling context instead of being "expert" is consistent with an empowerment approach. Analogously, the trainer's duty is not to transmit the various types of knowledge as they are, but to assist learners in acquiring them, favouring a personal appropriation of the contents (Hacken 1966).

The HEART study (HEART E.1., 1994) suggests a scheme of training modules in assistive technology varying in depth and duration. According to this study all actors in the rehabilitation technology field need knowledge/expertise in three main areas: *technical, human and general components*. Even if each professional needs a different amount of knowledge/expertise in different areas depending on his/her profession, duties and working environment, all actors in assistive technology need to sufficiently manage the three main areas. This study can be used as basis for EUSTAT.

According to the HEART study, a model for education in AT for professionals dealing with elderly people and people with disabilities, must be based on a model of human development; not only the technical problems of concretely adapting to an "adverse" environment, but also the need to provide the users with the tools enhancing integration into the wide society.

In order to formulate an effective pedagogic model, some questions should be asked about the role of AT in the support of persons with disabilities: Who are the persons with disabilities? Why are they sometimes unable to participate fully and independently in the social and economic activities of the community? How can AT reduce the gap?

Furthermore, having EUSTAT a European range, the cultural differences and different educational and socio-economic systems as well as the European Union policy on the sovereignty of the Member States with regard to the content and organisation of education must

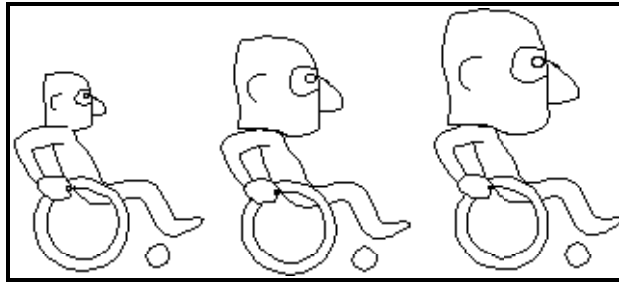
be also considered. In fact, the field of AT is fragmented since it covers different sectors of society and mainly the social, medical, technical and industrial sectors. Moreover, there are major differences between legislation for the disabled and legislation for the elderly as well as in the implementation of that legislation.

Line C of the HEART Study also stresses the need for a mutual exchange between professionals and users. The users must have possibilities to receive advice from professionals. Information about technical aid must be related to the problem to be solved and the aim of the service provided. The user becomes a partner in the process.

The HELIOS II thematic group 6 stressed the importance of establishing networks between information and advice centres and users, by means of information and training of the local providers. Experiments on this kind of action have already been done, but they need to be much better organised and more systematic.

An objective of Line E of the HEART study was to work on a European Curriculum. To do this, it has defined five fundamental characteristics of a European Curriculum. This seems also interesting in view of education of the end-users.

- *User focus*: the ultimate objective is to enable persons with disabilities and the elderly to reach an optimum level of capability by, for instance, reducing the demands of the environment through assistive devices. Needs of different groups of disabled persons and the elderly should be taken into account when planning an educational activity. Moreover, users' participation as protagonist in training and teaching programmes and courses should be encouraged: lectures, sharing of knowledge and experience, etc.
- *Multidisciplinary*: a European curriculum should include items related to information and knowledge dissemination to the end-users (advantages and disadvantages of different service delivery models, role, constraints, and perspective of manufacturers, distributors and suppliers).
- *New technology*: the best use must be made of mainstream technological developments and standards.
- *Market orientation*: the expansion of the Assistive Technology market on a European level will improve quality, reduce prices and involve users-consumers in the process. Curriculum should emphasise exploitation of single market opportunities.
- *Evaluation*: a European curriculum must take into account the evaluation issue, that is an important medium for quality control.



The knowledge grows, grows, grows
Adapted from M. Colomer (1995), "Manual of Training for personal to run the information system"

2.4. IDENTIFICATION OF CRITICAL FACTORS

2.4.1. The user's decision process

To meet EUSTAT objectives, the usability of AT must be related to the individuals' needs and expectations. This means that AT can only be beneficial if the proposed or identified solutions to the end-users problems have an effective value for them.

The end-user is the main actor of the process leading to the choice of AT. Six simple questions that end-users generally ask in practice can guide and summarise this process:

- What do I want to do?
- What can I do without AT?
- What cannot I do without AT?
- What can I do with AT?
- What can AT do for me?
- What can I do with other interventions?

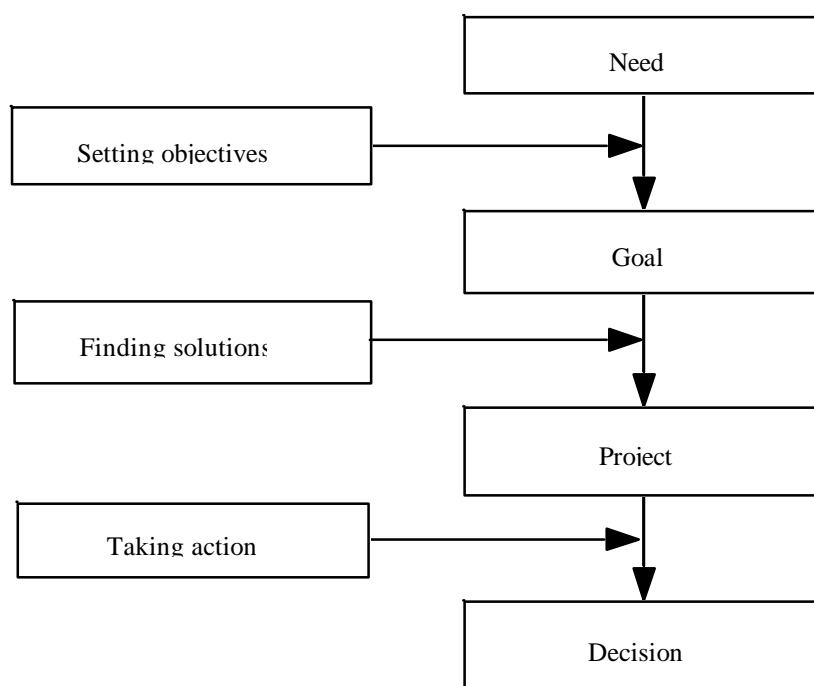
The same questions can be imagined by replacing "I" with "he/she", so obtaining the rehabilitation professional's point of view when they help the end-users in making their choice.

A disabled person willing to move outside can offer a typical example of the above questions. First, "what do I want to do?". The rehabilitation professional may sometimes face a slightly different situation: the need to allow an enlargement of the end-user's possibilities, the need to manage the dichotomy between his/her potential possibilities and his/her actual wishes. Here the delicate action of counselling finds its highest role. The person has problems moving. This is a fact. Would he/she like to move? If so, what is his/her precise situation both from his/her individual point of view and from a general point of view (his/her social context and environment)? Is a person like him/her able to move, to walk, to use a wheelchair? This first step of

the decision process, may imply a dialogue between the end-user and the rehabilitation professional; this dialogue is also a prerequisite to the knowledge transfer.

In order to illustrate the process leading to the final choice of AT, we can refer to the "constructivist" approach in the Hiebert and Smallwood's needs. The authors' "negotiation phase" leading to the decision can in this case more correctly be distinguished into: goal definition and establishment of a project. Unlike medical approaches, where decisions are made by professionals, AT is introduced on the basis of a decision taken by the individual user.

The adoption of a piece of AT is then the result of a complex process, which can be described as follows:



An educational process may not be sufficient to make the individual fully independent to take decisions and carry out actions. However, its potential to do this can be maximised. For example, it may include training on how to identify and use information sources available in the community.

Technical competence on available AT products and services is not enough to support such a process. Different kinds of knowledge are needed to support each step of this process: ability to set objectives, to find solutions and to take successful actions within available resources.

The importance of information must be underlined too: information about technical aids must relate to the problem to be solved and the aim of the service provided; it will lead to the identification of solutions

and the integration of services into overall habilitation/rehabilitation strategies.

The decision process in choosing AT has been described: but a lot of general and individual issues must be also considered when identifying the critical factors involved in end-users' education to AT. They are treated in the following chapter.

2.4.2. General issues and individual issues

In order to classify the critical factors involved in end-users' education to AT, a distinction must be done between *general* issues on one hand (which concern the global analysis of the connections between the end-user and his/her own person, home, community and society such as in the HELIOS framework) and, on the other hand, the *individual* issues related to the specific point of view of the user.

The general issues are related to norms, which classify the user within a category, positioning the user in the society. They can be represented by a top-down analysis starting from the global and moving to the individual. The observer is outside the analysed system. In the field of technical aids, this approach is based on traditional criteria, like the technical or functional approaches. Some advantages of this approach must be underlined because for example the situation of a visually disabled person cannot be analysed in the same way as that of a paraplegic, a disabled youth, or an old person.

On the other hand, this approach suffers from the research of scientific "objectivity" and risks to consider only technical and measurable criteria: the expression of the user's wishes and his/her own psychological situation is hardly taken into account. For example, the analysed handicap can be a consequence of a disruption of the ability to act within a particular environment, or can be related to an unsuitable physical or human environment.

The study of general issues can be called *level of similarity* because it gives the opportunity of taking advantage from the classification of handicap situations, allowing compensation by referring them to similar handicaps and existing solutions. General issues are for instance: disability classification, needs analysis, standardisation.

The individual issues are crucial for EUSTAT because they focus on the end-user. They can be represented by a bottom-up analysis, describing a particular situation in order to define a true need. This type of approach goes from the individual to the general and in this case the observer is inside the analysed system. This analysis may be done by the end-user with the assistance of another person (a peer, a counsellor, a trainer or a teacher). The user tries to evaluate his/her own personal in order to evaluate and establish his/her true needs, then

going on with the decision process as it has been described in the previous chapter.

Individual issues refer to personal identity, and to the personal representation of one's own past and present situation. They are related to the end-user's knowledge and perception of the situation. While the general issues make use of a similarity process, the individual issues may be called *level of differentiation* because they take into account all individual situations and their continuous change in time.

Some examples clarify the individual issues: the user may be young or old in a rehabilitation process; the user may be a senior disabled person or a new user of AT as a result of a progressive disease; user may have promising development potential, with high expectations for the future, or may have had a long life behind him/her, and is facing progressive functional decrements, etc.

In the EUSTAT approach, general and individual issues are complementary. The general issues play an important role at the beginning of an educational process on AT. They "set the scene", defining the context in a global way, and determining a lot of variables of the process itself (language, tools, contents, etc.).

The *general* issues could be used to define a EUSTAT macro-model for AT education. In a general system analysis, in fact, a macro model is useful to define roughly the different parts of the system. The *individual* issues will refine the previous analysis. At the beginning they are considered independently of the macroscopic analysis, focusing on the user only. The individual issues - e.g. the detailed analysis level - could be used to define the EUSTAT micro-model for AT education. As soon as the true needs begin to be identified (the objective of the individual issues analysis), the general issues determine whether this is a usual case for which a standard solution exists. The comparison between available standard solutions and the end-user's expectations gives a new standpoint from which the user can imagine a more comfortable and effective situation for his/her life.

2.4.3. Domains of critical factors

In what follows, a first attempt to identify sources of critical factors is presented. A more systematic classification will be presented in Chapter 3. Such sources can be grouped into three major domains: the end-user, the Assistive Technology and the training process. Involved critical factors may vary from person to person, from one social setting to another, from one disability group to another, etc. It is then important to be aware of the total spectrum of critical factors, to identify every time the most important ones, using a holistic approach.

In fact, success or failure in the usability of AT for an end-user is dependent on the process and method used to introduce this technology to the individual person.

Domains related to the end-user

The domains related to the end-user concern the ability to strive for and achieve the goal of autonomy at all levels, as well as to live in harmony with one's own body, home, family, community and society. We identified them as: body, mind and personality, environment, activities and cycle of life.

- *Body*: physical needs, health needs, anatomical requirements, safety requirements, etc.
- *Mind and personality*: these domains govern the behaviour of the person with disability, his/her close relationships and feelings, his/her life choices, etc. The following questions/reflections can be useful in determining some psychological aspects:
 - What are the person's feelings?
 - What is his/her personal concept of independence?
 - What is his/her state of mind with regard to his/her disability?
 - Is this state compatible with the idea of using AT?
 - Is he/she interested in an education tool concerning AT?
- *Environment*: social, cultural and technical environments are the three dimensions of this domain. These dimensions describe the external elements which play a positive (facilities: a ramp) or a negative (barriers: a step) influence on the use of AT. Barriers and facilities may prevent or allow the use of AT, and for this reason they must be strongly taken into account; they can warn the user of the possible risks of failure, or, on the contrary, they can encourage the end-user to undertake initiatives. Furthermore, also this domain cannot be described in an "objective" and final way, because user requirements may vary according to the customary environment.
- *Activities*: this domain concern a deep analysis of a person's activity in a given situation in order to identify a desired mode of life. All life tasks and activities have to be considered; they cannot be specified on a general basis. The activity domains depend upon the user's personal project, his/her preferences, priorities, ethical values, experience, expectations of life, attitudes; last but not least, upon expectations concerning AT.
- *Life cycle*: the life cycle aspects refer to major changes in the person's life, due to age, starting professional life, family events, etc.

Domains related to AT

These domains depend on the objectives AT has to meet, on some characteristics of AT, on the market and on functional aspects.

- *Objectives to be met:* in a first sense, AT can be in close interaction with body functions, to replace lost functions. Prosthesis, hearings aids, functional electrical stimulators, are AT tools of this kind. In a second sense AT can be aimed at problem solving, and comes to the user where the problems occur (at home, leisure, school, work, etc.). A good example is in this case the wheelchair: it may solve a mobility problem but cannot replace lost legs.
- *Characteristics of AT:* some characteristics of AT influence the choice process. Ergonomics, durability, performance, availability, safety, quality, functionality, compatibility, accessibility, cost, design/size, after sale service/repair, standardisation, noise, saturation, need for regular new adaptation, etc.
- *Service delivery:* geographical, cultural and political differences are aspects to be taken into account before establishing a model of knowledge transfer.
- *Functional aspects:* these aspects concern the analysis of a technical aid functioning; they are strictly related to the described end-user domain: life cycle, mind and personality, body, etc.

Domains related to the processes of knowledge transfer

These domains have been analysed and described in detail in chapter 2.3. Here they can be summed up as: type of process, type of knowledge, pedagogical issues, content issues.

- *Type of processes.* Four main processes have been identified in AT knowledge transfer: counselling, training, teaching, information. In addition, awareness campaigns can be considered as a medium of information dissemination on a large scale.
- *Type of knowledge.* Theoretical, procedural, practical and know-how knowledge have been deeply described.
- *Pedagogical issues.* They have been described and a special accent has been given to: the styles of knowledge and information transfer, the relationships of the teaching/learning process actors, as well as the chosen theoretical framework and its consequences in practice.
- *Content issues.* All fields of AT must be an integral part of the training (technical, communication, etc.); HEART study has stressed the importance of dealing with technical, human and general contents.
- *Organisational issues.* Since EUSTAT is specially interested in educational activities addressed to groups of end-users, issues concerning organisational domain must be also included. They can be, for instance: selection procedure, advertisement process, financial scheme, etc.

In conclusion, a lot of factors is involved in the process of choice of an AT and in an educational process leading to this choice. Since most of this factors are related to the others, and since they have to be considered altogether, it would be incoherent to establish a hierarchy. Chapter 3 will describe these factors.

3. CLASSIFICATION OF CRITICAL FACTORS

3.1. CLASSIFICATION FRAMEWORK

3.1.1. A general model for educational initiatives

The analysis carried out in the previous chapters suggests that the number of factors that play a role in the process of knowledge transfer to the end user in relation to assistive technology is quite large.

Chapter 2.4. analysed the process that leads from the identification of the need to the choice of AT. When going through such a process each individual may encounter barriers and difficulties, and needs to take decisions at various steps. Being empowered means to be able to take control over the whole process. For such a purpose, just theoretical knowledge on assistive technology is not enough: both practical knowledge, procedural knowledge and know-how are also needed, as described in chapter 2.3.

If the objective is empowerment, the process of knowledge transfer should be comprehensive. It should aim at modelling the personal growth of the individual end-user in such a way as to enable him/her to identify his/her own needs and set his/her goals, to work out effective projects able to achieve such goals in the daily life context, and to carry out actions able to put projects into practice. Needs, goals, projects and actions cannot be standardised, since each individual is unique in setting his/her values, priorities, choices, and lives in a different human, cultural and physical environment. An effective knowledge transfer process is respectful of this specificity: in metaphoric terms it should provide the *fishing rod* instead of the *fish*.

Chapter 2.3.2. identified five kinds of knowledge transfer processes: *counselling, training, teaching, information and awareness campaigns*. In this chapter, only the *training* and the *teaching* processes are considered, being those included in the scope of the EUSTAT project. Hereinafter both will be referred to with the broader term *education*.

Education initiatives are activities where an *organiser* (usually an institution or an association) delivers knowledge to a group of *trainees* in a structured way according to a given programme and a given method. EUSTAT is concerned with initiatives in which *trainees* are end-users (as defined in chapter 1: disabled people, elderly with disabilities, helpers) and not AT advisers or providers.

Such initiatives may aim at :

- individualempowerment in the choice of specific AT, or

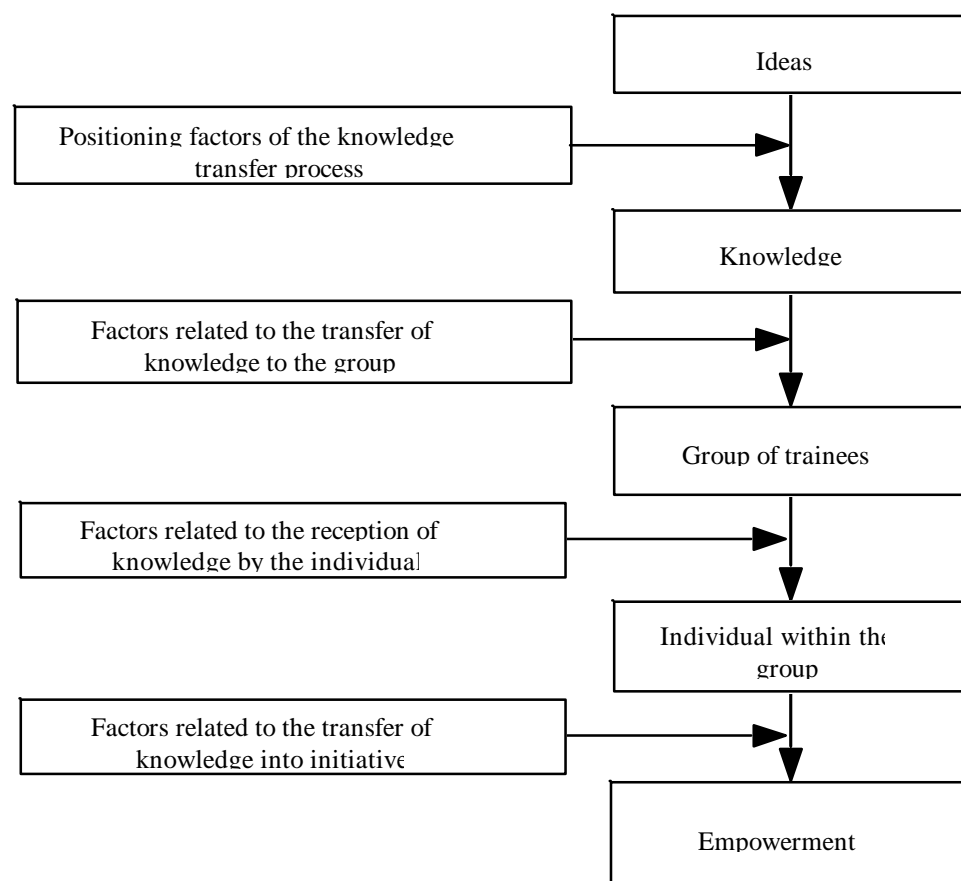
- coping better with all aspects of disability with the support of AT, or
- a more comprehensive education to independent living, or even
- exploiting the specific competence of people with disabilities (e.g. peer counselling training).

In designing educational initiatives, the *organiser* has to consider a number of *critical factors* and take decisions on them. As said in Chapter 1, the term “critical factors” refers to all those aspects influencing the transfer of knowledge on Assistive Technology to the trainee, and his/her resulting ability to make informed, effective and satisfactory choices. There may be critical factors that have a negative influence, others that yield a positive influence, other that may act positively or negatively when cross-related with other critical factors.

It is clear from the previous chapter that there is a large variety of critical factors, and no inherent hierarchy can be established among them a priori. Most of them are related with to other, so the choices made for one of them may reflect on many others. The organiser is the one who sets priorities and takes decisions depending on the scope, the target and the context of each educational activity. The scope of a classification is only to bring critical factors to the fore, to sort and describe them in a logical manner, so as to offer the *organiser* a checklist of aspects to be considered.

Chapter 2.4. looked at critical factors from various perspectives, in order to illustrate the complexity of their reciprocal interrelations. The following classification (chapter 3.2) looks at them from the perspective of the flow of knowledge. By following the process by which the body of knowledge takes shape in the mind of the *organiser*, and through a number of phases becomes instrumental to end-user empowerment, it is possible to identify the factors that exert a major influence at each stage.

This flow is schematised by the following diagram :



4.1.2. Clusters of critical factors

Positioning factors

When the *organiser* starts to design an educational initiative, by and large he/she already has a policy in mind that defines, even if at a very general level :

- the size and type of target (e.g. many people Vs restricted number, homogeneous Vs heterogeneous groups, etc.),
- the scope of the knowledge to be transferred (e.g. “horizontal education” Vs specific training, etc..), and
- the level of structuring.

This policy may depend on the corporate strategy of the organising institution, on the experience of the *organiser*, on environmental constraints and on a wide number of other variables. Critical factors that appear at this stage are called “positioning factors”, since they define where the education or training initiative is mainly “positioned” with respect to the axes initiative/competence and structuring/target described in Chapter 2. The concept of positioning has been borrowed from marketing terminology, where it indicates in strategic terms the audience to which a product is addressed; in fact educational initiatives, although most often offered outside any commercial scheme, can also be seen as a “product” addressed to an audience.

Factors relevant to the transfer of knowledge to the group

Educational activities are usually directed towards groups of people. Criteria that define who is going to take part in the group (anybody interested? those who share a common situation? very specific groups?) should be established. Decisions have to be taken concerning aspects like the methods of transferring knowledge, the domains of assistive technology to be addressed, the practical organisation etc. Choices made at this stage have a substantial impact on the effectiveness of the transfer of knowledge to the group of *trainees*, and in turn to the individual *trainee*.

Factors relevant to the reception of knowledge by the individual

One *trainee* may not receive or interiorise knowledge being transferred to the group exactly in the same way or to the same extent as another trainee. There may be personal factors that affect the interest in the topics being taught, the subjective perception of their importance, the level of attention or concentration. There may also be factors linked to the private personal background that have an impact on readiness to learn some topics. These factors should be given appropriate importance in the design stage, and can be properly accommodated by adjusting methodological and organisational choices. If neglected, such factors might lead to an overall ineffectiveness of the educational initiative.

Factors relevant to the transfer of knowledge into initiative

When *trainees* go back to their daily life environment, they will be the protagonists of their lives and their choices. Each has to cope with the opportunities and the barriers that exist in the local community, such as availability of services (information, counselling etc..) as well as physical or organisational barriers that hinder the access to them. The possibility of implementing choices may encounter an obstacle in the unavailability of products, financial burden, cultural attitudes, or alternatively may be expanded by good-quality service delivery systems, excellent product supply services, affirmative legislation etc.. Differences in the living environment of *trainees* should be kept in mind by the *organiser* : for instance, training a group of people from various countries with different social-cultural environments may mean different organisational or methodological choices than those made when training a group of people from the same region. Likewise, the knowledge of existing barriers in the community (market, social image of disability etc.) may suggest that the organiser needs to give more room in the training curriculum to aspects that might be given less importance when dealing with *trainees* that live in an area where the supply of products is better organised.

O. Structure of the classification

The EUSTAT classification is a three-level-structure checklist that groups critical factors in to four clusters, each divided into classes of factors. Each cluster corresponds to one of the four steps of the knowledge flow as described above.

Inside the various classes, each critical factor underlines an issue that deserves consideration when designing a training or an educational initiative.

First, the organiser should decide whether in the specific case he thinks such a factor is relevant or not. If it is relevant, a list of *attributes* is presented, that are intended to make the critical factors self-explanatory, and also exemplify possible choices to be made or aspects to think about.

Attributes may be expressed in term of

- options (e.g. children | teenagers | adult | age, see critical factor B.3.1),
- aspects to be addressed (e.g. accessibility | comfort | resting facilities | ..., see critical factor B.4.5), or
- trends (e.g. short Vs long time since the onset of disability, see critical factor C.1.4)

For instance, the last example means that the more experience the person has in terms of disability, the more the predisposition to learn AT may change. The following scheme helps understand the classification structure.

X Clusters of critical factors

X.X class of critical factors
explanation (why this class of factors is considered critical)

X.X.X critical factor
attribute 1 | attribute 2 |

As said above, the order of the list does not correspond to any hierarchy. For instance, having B.1 as pedagogical factors and B.2 as content factors do not mean that pedagogical factors should be considered before content factors, not that the former are more important of the latter. Likewise didactic method (B.1.1) yields no hierarchy with respect to teaching style (B.1.2) and so on. All factors have no inherent priority : they should be taken into account as a whole, it is the organiser of the educational initiative who takes decisions on values and hierarchies depending on the specific scope and context to be addressed.

A. Positioning factors of the knowledge transfer process

A.1. Type of knowledge transfer process
Factors defining the general strategy of the educational initiative, in terms of size or extensions of the group of trainees, depth of knowledge to be transferred to

them, relationship to be established with each etc. The rationale behind them is described in chapter 2.3.2. and 2.3.4..

- A.1.1 objective of the process
less Vs more stress on initiative / less Vs more stress on competence
- A.1.2 target and relationship with the recipients of knowledge
individual Vs general / formal Vs informal

B. Factors related to the transfer of knowledge to groups of trainees

- B.1 pedagogical factors
Factors defining the method to deliver knowledge
 - B.1.1 didactic method
lecture / group work / modelling / co-operative learning / distant learning
 - B.1.2 teaching style
questioning / interactivity / simulation / learning by doing / discussion / real-life examples / well-structured presentation
 - B.1.3 learning aids
no material / handouts / audiovisuals / informatic tools / telematic tools
 - B.1.4 learning setting
residential / full immersion / distributed over time / random scheduling
 - B.1.5 participants selection criteria
open to anybody interested / pre-defined criteria / case by case decision by the organiser
 - B.1.6 teachers selection criteria
members/staff of organisation / level of expertise / reputation / being disabled / being disabled with specific expertise / being a disabled representative
 - B.1.7 co-ordination of the teaching process
unique teacher / more teachers with one co-ordinator / team/ progress meetings / no co-ordination
 - B.1.8 self evaluation techniques
no feedback collected / final questionnaire / final open group discussion / collection of personal impressions
 - B.1.9 knowledge to be achieved
theoretical knowledge / procedural knowledge / practical knowledge / know-how knowledge
- B.2 contents factors
Factors defining the body of knowledge on AT to be delivered
 - B.2.1 human components
anatomy / psychology / sociology / ethics / biomechanics / knowledge transfer / physiology / disabilities

- B.2.2 domain of assistive technology
augmentative communication | mobility | vision | hearing | reading/writing | household activities | health maintenance | recreation | self-care | employment | learning/cognition
- B.2.3 socio-economic components
service delivery/actors | standard/testing | legal and economic aspects
- B.2.4 application environment of AT
body/mind | family | lodging | society
- B.3 targeting factors
Factors defining the composition of the group of trainees
 - B.3.1 age
children | teenagers | adults | elderly
 - B.3.2 impairment
cognitive | sensory (hearing, visual) | motor
 - B.3.3 barriers faced
orientation | physical independence | mobility | occupational | social integration
 - B.3.4 role
person with disability | helper | peer counsellor
 - B.3.5 pathology
homogeneity Vs heterogeneity of pathologies
- B.4 management / organisational factors
Factors defining the organisational structure required for the course
 - B.4.1 venue
residential | on centre | on site (itinerant) | domicile
 - B.4.2 selection procedure for trainees
open admission | upon invitation | verification of eligibility | individual examination
 - B.4.3 advertisement process
leaflets/pamphlets | specialised journals | newspapers | radio/TV | Internet
 - B.4.4 related social activities
assistance with travel/accommodation | meals/refreshments | cultural/recreational events | welcome/farewell sessions
 - B.4.5 physical environment
accessibility | technical facilities (e.g. audiovisuals, computers) | personal assistance on site | comfort (seating/ acoustics/ lighting/ climatising) | resting facilities | aesthetics

- B.4.6 financial scheme
free of charge / fee contributing partially to costs / fee fully covering costs

C. Factors related to the reception of knowledge by the individual

- C.1 predisposition factors
Factors that influence the individual level of understanding of the knowledge delivered to the group
- C.1.1 educational level
illiteracy / compulsory education / secondary education / higher education
- C.1.2 awareness of pathology
low Vs detailed knowledge of own pathology
- C.1.3 acquaintance with technology
technophilia Vs technophobia
- C.1.4 seniority of disability
short Vs long time since the onset of disability
- C.1.5. previous experience with assistive technology
no experience / limited experience / deep experience
- C.2 pathology-related factors
Factors that influence the individual availability to receive the knowledge being delivered to the group
- C.2.1 physical stress tolerance
short Vs long time endurance
- C.2.2 cognitive ability
attention / concentration / memory
- C.2.3 course of the pathology
stable Vs developing
- C.3 individual attitudes towards disability
Factors that influence the individual motivation to receive the knowledge being delivered to the group
- C.3.1 individual image of disability
refusal of difference (“labelling”) / denial of difference (“underestimation”) / extraordinary difference (“superman”) / acknowledgement of difference / self-determination
- C.3.2 individual image of assistive technology
extending abilities / tool for living / burden but need / stigma of disability
- C.3.3 individual feeling about autonomy
independence Vs dependence desire
- C.4 individual expectations
Factors that influence the individual willingness to learn

- C.4.1. expectations in the domain of inner relations
self esteem / assertiveness / problem solving ability
- C.4.2. expectations in the domain of daily activities
range, preferences, priorities and value assigned by each person to the various daily life activities
- C.4.3. expectations in the domain of outer relations
range, value and depth of the relationship with other people as desired by the individual

D. Factors related to transforming knowledge into individual initiative

- D.1 social attitudes towards disability
Factors that influence the extent to which the people in the local community support or create obstacles for the willingness of the individual to adopt assistive technology
 - D.1.1 image of disability in the local community
refusal of difference (“labelling”) | denial of difference (“underestimation”) | extraordinary difference (“superman”) | acknowledgement of difference | self determination
 - D.1.2 image of assistive technology in the local community
extending abilities | tool for living | burden but need | stigma of disability
- D.2 environment factors
Technical or organisational factors in the local community that exploit or limit the effectiveness of individual assistive technology.
 - D.2.1. architectural barriers
accessible Vs inaccessible architectural environment
 - D.2.2. organisational barrier to the use of services
complexity | cost | co-ordination | continuity| attitudinal
 - D.2.3. living environment
own home | rented home | institution | small group | supported living
- D.3 social support factors
Facilities, services and competence available in the local community or within easy reach that are prepared to support the individual in making informed, responsible and effective choices
 - D.3.1. information services
databases | catalogues | guides | publications | exhibitions
 - D.3.2. counselling services
technical aids advice services | disability resources centres | peer counselling
 - D.3.3. advocacy/management services
practical assistance in implementing the individual’s initiative

- D.3.4. health / rehabilitation facilities
AT expertise of health/rehabilitation professionals in the local community
- D.3.5. service delivery system
legislation / procedures / fixed list of devices allowed for prescription / user influence on decision / appeal
- D.3.6. public funding
totally funded / substantial funding / little funding / no funding
- D.4 Market factors
Influence of market on the availability of assistive technology
 - D.4.1. purchase cost (with respect to individual resources)
low / affordable / not affordable
 - D.4.2. maintenance cost (with respect to individual resources)
low / affordable / not affordable
 - D.4.3. range of products available
limited Vs comprehensive
 - D.4.4 products design factors
safety / standardisation/certification / ergonomics / robustness / performance / compatibility / upgradability / aesthetics
 - D.4.5 supply service quality
selling / post sale service / training / possibility to try before purchasing / repair / recycling / renting
- D.5 social network factors
Factors that influence the extent to which the network of people around the individual co-operate in the design and implementation of the individual assistive technology programme
 - D.5.1. expectations of family / primary network
availability Vs resistance to change / favouring Vs restraining independence
 - D.5.2. expectation of professionals
consistency Vs inconsistency between AT and the individual rehabilitation programme
 - D.5.3. expectations of the outer network
role of the individual in the community
 - D.5.3. role modelling
presence in the network of other peers that are perceived as models

3.3. CONCLUSIONS

This document carried out a detailed analysis of issues related to the empowerment of disabled persons, elderly with disabilities and helpers, with respect to Assistive Technology. The empowerment process is mainly a matter of personal growth that aims for something much broader than just pure technical knowledge.

For this purpose the path that leads from the identification of the need to the concrete expression of a choice was carefully studied, in order to find out which elements of knowledge are needed to promote empowerment. Five types of knowledge transfer processes were identified, each having a specific role and complementing the others.

The *education* processes (training and teaching), fall within the specific EUSTAT scope. Therefore the factors that deserve consideration in the delivery of training and education initiatives have been analysed in more detail, leading to the EUSTAT classification of critical factors illustrated in chapter 3.2. It will be the task of the Guidelines to guide the organiser of training or education initiatives in the “navigation” through critical factors, to help him/her take appropriate decisions.

This documents also provides the ground for the development of the “User Manual on Assistive Technology” that is planned within the EUSTAT project.

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- THE NORDIC COMMITTEE ON DISABILITY. *Nordic guidelines for computer accessibility*. Bromma: The Nordic Committee on Disability, 1993.
- TRACE RESOURCE BOOK 1996/97. *Assistive Technology for Communication, Control and Computer Access*. Madison: Trace Research and Development Center, 1996.
- VILLALTA M.F. (Ed.). *Tecnologías de la Información y Discapacidad*. Madrid: FUNDESCO Colección Estudios y Documentos, 1988.
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4.2 REVIEW OF SELECTED HANDBOOKS

ALLIANCE FOR TECHNOLOGY ACCESS. *Computer resources for people with disabilities*. Hunter House Publishing, 1994.

Besides providing very comprehensive information on computer access solutions, this book is also a great reference to AT vendors and service providers. It is written in plain language and does not require technical knowledge. The first section is addressed to the AT consumer or to the person helping someone with computer access; and it considers the process of setting AT goals, finding information about access solutions, establishing support systems, locating funding, and purchasing AT. The second section of the book contains the Frequently Asked Questions that potential users can ask to determine their computer access needs; the answers it gives are linked to the existing potential devices to meet those needs. The third section provides a comprehensive resource directory, including contact information for Alliance for Technology Access Centers and State Tech Act Programs, AT-related organisations, national conferences, databases, a list of AT vendors, and the text of the Americans with Disabilities Act.

This book is also clear for persons who lack computer expertise and it can be useful for consumers, parents, and those who are just beginning their journey into technology. It is also indispensable to those who work with computers and AT daily.

ANDRICH R. *Ausili per l'autonomia*. Milano: Fondazione "Pro Juventute", 1988. "Technical aid for autonomy".

Published in 1988 and reprinted in 1996, it offers comprehensive information and explanation on AT for people with physical disability. The first chapter analyses some basic concepts like independent living, the definition of assistive devices and their role within the rehabilitation process. The following chapters address specific problems like home adaptations (home environments, furniture etc.), activities of daily living (eating, washing, personal hygiene, management of incontinence etc., mobility (walking aids, wheelchairs, hoists, cars etc.), communication (communicators, writing and conversation aids, computer access, telecommunication devices etc.). The fifth chapter provides further details on technological solutions to particular disabilities or situations like blindness, childhood, school integration. The handbook was designed

for both users of AT and rehabilitation professionals, with special attention given to the information needs of people with disabilities and their families.

ANTICO L., CARETTA F., PETRINI M. *Vivere con le persone anziane*. Regione Molise: Università Cattolica del Sacro Cuore, 1990.

“To live with the elderly”.

The video (duration: 36’) is addressed especially to the relatives of elderly persons, since its main idea is that the elderly can live better if they have strict and continuous relationships with their families and relations and if young people respect them, their feelings, their habits of life.

Beginning with the idea that ageing is a normal phase in a person’s life, the particular phase of wisdom, it states that old age can be rich in spirituality and in creativity.

A lot of suggestions and advice are then given to the public, both in a psychological sense and in a practical way, on the following issues: personal hygiene, dressing and going out, relationships with children, loss of memory, emotional relationships, feeding, social needs, bedsores, medicines, pain, assistance/assistive technology (bathroom and kitchen).

Texts, music and images are very clear and harmoniously related.

BOULONGNE D. *Classification et financement des Aides Techniques. Le domicile: espace de vie, de confort et de soins*. Proceedings of the “8èmes Journées d’Etudes Nationales d’Ergothérapie”. 1991.

“Classification and financing of Technical Aids. At home: living, comfort and care space”.

This article points out the lack of necessary coordination at both French and European levels of the different actors in the field of AT: users’ need, research, distribution. The involvement of AT users and their role as consumers are underlined.

BOZIC N., MURDOCH H. (Ed.). *Learning Through Interaction - Technology and Children with Multiple Disabilities*. London: David Fulton Publishers, 1996.

This book was written particularly for teachers and other professionals who work with children with multiple disabilities, with the main objective of exploring and suggesting ways to use different forms of assistive technology with this client group. The book is divided into three main parts: Part 1 - Working with Computers, Part 2 - Learning in Technological Environments and Part 3 - Technology as a Personal Tool, with the contribution of several authors. In keeping with the general aim of the book, attention is focused on the practitioner’s role in the successful use of assistive technology .

BRIGHTMAN A., GREEN P. *Independence Day - Designing Computer Solutions for Individuals With Disabilities*. Allen, Texas: DLM Publisher, 1990.

This is a book published by Apple Computer, intended to help people understanding the potential benefits of people with disabilities using personal computers. After introducing to the reader the very basic fundamentals of personal computers, *Independence Day* introduces to four individuals, each with different disabilities, who are in the process of designing personalised computer solutions. It also includes the names of a number of specific products, together with the information to contact their manufacturers. In the Appendices, North American organisations dedicated to support computer users with disabilities, are listed.

BRUNELLES P. *Histoires d’Aides Techniques - Handicaps et Inadaptations*. Paris: Les Cahiers du CTNRHI 1994: 62; 45-60.

“History of Technical Aids - Handicaps et Inadaptations”.

Using the opinions of occupational therapists and handicapped people on the design, use and different perceptions of AT, the author underlines the risks of conceiving AT solely as a technical object of compensation, while it is a real part of the user’s own life planning. This outlook stresses user responsibility and intellectual participation to the process.

CENTRE INTERDISCIPLINAIRE SUR LE VIEILLISSEMENT. *Repers - Senior*. Bruxelles: 1995.

Where can elderly people do any kind of sports? What kind of home care should you choose for your grandmother? How to go to the hospital for your dialysis? Reper-senior attempts to answer to all these questions. It lists all the specialized services in Brussels, because to be an elderly person doesn’t mean life’s activities from the sidelines.

CHARLEBOIS-MAROIS C. *Everybody’s Technology - a Sharing of Ideas in Augmentative Communication*. Montreal: Charlecoms, 1985.

The author is an Occupational Therapist from Canada who after a one year trip to specialised centres, hospitals and schools in several countries in 1980, decided to present in a book a great deal of information on

seating, mobility and communication aids for children and adults with cerebral palsy. The purpose of the book is to give ingenious and innovative ideas (most of them very “low tech”) to professionals, parents and users of assistive devices for AAC.

CHURCH G., GLENNEN S. *The Handbook of Assistive Technology*. San Diego: Singular Publishing Company, 1992.

The first chapter discusses models of service delivery and funding options. The second chapter provides an exhaustive overview of computer technology for those who are unfamiliar with the specific terminology. Chapter 3 outlines important issues in positioning individuals when using AT and gives suggestions for selecting powered mobility aids. Chapter 4 offers a short explanation of assessment methods and options for augmentative and alternative communication. The next chapter discusses the considerations which are important in choosing an adaptive method of access to the computer, going from the simple to the more complex. Both the cognitive and physical demands of assistive devices are explored. For each level of access, there are sets of questions and illustrations to help readers determine the best method for their student or client. Chapter 7 discusses the use and selection of adaptive toys and environmental control units, while chapter 8 explains the process of using AT to increase participation of individuals with disabilities in educational and community settings. The final three chapters include an AT product directory, a listing of AT resources, and a glossary of terms. Although products have changed and new products have been introduced since this book was released, the product directory is still comprehensive and is written objectively in plain language. Case studies are included to clarify concepts.

This book would be a good resource for anyone who needs AT information, including special educators, regular educators, and rehabilitation professionals. It is especially good in outlining options for those with more severe physical and/or cognitive disabilities.

CNFLRH. *Guide des Aides techniques pour le bien-être des personnes âgées*. Paris: CNFLRH, 1991.

“Guidebook of the technical Aids for the elderly’s wellbeing”.

The equipment is classified in main fields: locomotion, aids to grasping, sanitary equipment, leisure, etc.. For each technical aid considered, there is a photo, a description, advice on equipment, a price scale and coverage by Social Security (in France).

Report made from the reflections of a working group appointed in 1994 by Simone Veil on the role of AT in disability compensation and handicap prevention, on the information about AT and the training of the actors involved, the process of AT delivery and prescription, the economic aspects and financing.

This reflection leads to proposals of an experimental new methodology of AT delivery, and a project for creating a national advisory committee for compensation solutions.

COOK A.M., HUSSEY S.M. *Assistive Technologies: Principles and Practice*. St. Louis: Mosby, 1995.

Cook and Hussey’s book is a bit more theoretically-oriented than the others reviewed here. Looking at AT from a human performance perspective, the book explores, in detail, the interaction between humans, technology, and their context of life. Chapter 4 offers a good discussion of AT assessment, keeping all the three factors in mind. Occupational and physical therapists will appreciate Cook and Hussey’s examination of seating and positioning issues in Chapter 5. The book also includes chapters on augmentative communication, powered mobility, environmental control, and technology for those with sensory impairments. This book is extremely clinical in its approach to AT. Therefore, those from clinical backgrounds, such as occupational therapy, physical therapy, speech therapy and rehabilitation engineering, may be more comfortable with this book than parents, consumers, or educators.

DE LA BELLACASA R., GARCIA VISO M. (Eds.). *Empleo, Discapacidad e Innovaciòn Tecnològica*. Madrid: FUNDESCO Coleccion Estudios y Documentos, 1987.

The aim of this book is to offer their readers an overview of how Information Technology (IT) can improve working conditions of disabled workers, with positive changes in their quality of life and for companies where they are employed. It also presents practical and successful examples of the use of assistive technology in working conditions.

ENDERBY P. (Ed.) *Assistive Communication Aids for the Speech Impaired*. Edinburgh: Churchill Livingstone. 1987.

According to the Editor, this book was written for speech and occupational therapists, teachers, rehabilitation engineers, and other professionals, that are involved in improving the quality of life of multiply-handicapped persons. Although it was written 10 years ago, about a fast and growing field like Augmentative and Alternative Communication (AAC), is still an interesting resource for professionals and users interested in the field of AAC.

FLIPPO K.F., INGE K.J., BARCUS M. *Assistive Technology: A resource for school, work, and community*. Paul H. Brookes, 1995.

This book offers many new perspectives on AT. The first section includes chapters which outline the legal foundation of AT policies and exemplifies this legislation through a case study of Virginia Systems Change. The second section includes chapters on augmentative communication, mobility, AT for those with vision and hearing impairments, applications of AT in educational settings, AT in employment, and using AT to broaden recreation options for people with disabilities. The third section is what sets this book apart from other AT books, with chapters discussing AT training, staff development, funding, communities, and perspectives of AT consumers.

This book will be especially helpful to administrators of AT service and special education programs and educators and service providers working with older students with disabilities.

FLOYD M., *Information Technology Training for People with Disabilities*. Disability & Rehabilitation Series, v. 4. London: Jessica Kingsley Publishers, 1993.

There is a general consensus that for disabled people to share in the benefits that information technology (IT) may bring to their lives, they would need to be provided with much better training than had previously been available to them. This book focus on the possibilities and opportunities now available: Part I explore the issues that need to be addressed if the impact of IT on disabled people is to be as positive as possible (it includes a Chapter about models of IT training for people with disabilities); Part II presents detailed case studies of particular initiatives in this field.

GALVIN J.C., SCHERER M.J. (Ed.). *Evaluating, Selecting and Using Appropriate Technology*. Maryland: Aspen Publication, 1996.

According to their authors, this book has been designed to lead the reader through the process of assistive technology selection, while underscoring the need for a comprehensive evaluation before any assistive technology device or service is recommended or purchased. The book puts the focus on the consumer of assistive technology. Chapter 1 provides a model for service provision and outcomes assessment that emerged from real life experiences of people with disabilities. Chapter 2 through Chapter 10 focus on the evaluation, selection and use of assistive technology for various purposes and in a variety of contexts. Chapters 11 and 12 address the topic of compute access and Chapter 13 a projection of the next generation of technologies. Chapter 14 and 15 are more specific of the North American situation, focusing on legislation and funding.

JAY P. *Coping with disability*. London: DLF, 1981.

Coping with disability is intended primarily for disabled people, their families and friends, but also professionals trying to help them. It contains advice on how to make life easier in the home; there are sections on mobility, including information about walking frames and wheelchairs; on keeping in touch, including alarm systems and communication aids. For those who are keen to continue their interest outside the home, there are sections on how to get out and about, whether by specially adapted cars or by aeroplane; on pasttimes and leisure activities. The final chapter is concerned with less obvious, but just as important, areas: how it may feel to become disabled and how disability may affect relationships with other people.

LAZZARO J. *Adaptive technologies for learning and work environments*. American Library Association, 1993.

Lazzaro begins this book by looking at barriers to computer access for people with visual impairments, hearing impairments, and motor and/or speech impairments. He also relates computer access issues to the Americans with Disabilities Act (ADA). The second chapter offers a general overview of personal computers. Lazzaro then devotes separate chapters to technologies, which assist people with specific disabilities, i.e., visual impairments, hearing impairments, mobility and/or speech impairments. Each of these chapters ends with extensive resource lists for technology for the disability addressed. The third chapter discusses the use of AT on networks, in telecommunications, with CD-ROM technology. The next chapter explains the role of rehabilitation engineers, the process of training people to the use of AT, and options for obtaining technical support. In the final chapter, Lazzaro outlines options in funding AT. Lists of organizations, conferences, journals and newsletters, and state AT projects are included in the appendices.

This book is unique in that it offers more information on AT for people with visual and hearing impairments than other books. It does not address technology for people the cognitive disabilities. It is geared more toward older students and adults with disabilities entering the workplace.

LAZZARO J. *Adapting PCs for disabilities*. Addison-Wesley, 1996.

Lazzaro's second book on AT reminds that humans who use computers don't live only in a Macintosh world. Many individuals with disabilities, especially those in the business world, need to access IBM compatible computers. The book explains options for making the PC's keyboard and monitor accessible and how they can be used to augment communication for people with hearing, speech, and physical impairments. A unique feature of the book is Lazzaro's discussion of ergonomics, explaining how lighting, workstations, and monitor arms can be arranged providing comfort and support to ensure that computer users with disabilities function at the highest possible level. Another unique feature of this book is that it is accompanied by a CD-ROM, which contains the full text of the book, software and demos of software which make PC's accessible, and other helpful information.

Persons who need access to DOS systems will find the book and CD-ROM more helpful than those needing access to Microsoft Windows 3.1 or 95, since access options for these systems have increased in the past year and would not have been known at the time the book was written.

LEWIS R.B. *Special Education technology: Classroom applications*. Pacific Grove: Brooks/Cole, 1993.

Lewis divides her book into three sections. The first section contains an overview of AT in special education classrooms, the process of adapting computers, and tips for selecting software. The second section focuses on practical applications of AT in the classroom, including chapters on technology in early childhood special education, using technology with students who have severe disabilities, software for specific academic domains, using AT to teach writing to students with disabilities, and using multimedia, networks, and telecommunications. The third section includes chapters on augmentative communication, AT for students with physical disabilities, and AT for students with sensory impairments, and a glimpse at the future of AT. Lewis ends the book with a glossary, list of AT vendors and instructional resources such as videos and software.

This book is packed with practical suggestions for integrating AT into the educational process, which would benefit both regular teachers and special teachers. Although some of the software highlighted has been updated and changed, the general framework is still up-to-date. Teachers of students with severe disabilities and sensory impairments will find this book helpful.

MAC FEE S. Choisir une aide technique. *Déficiences motrices et handicaps*, 1996; 21
"The choice of a technical aid".

This is a general article on AT; it gives an overview of some important issues: differences, classification, assessment, information and personalized advice, tests, acceptance, financing and perspectives.

MALE M. *Technology for inclusion: Meeting the special needs of all students*. 1994.

Male offers several different perspectives on AT in her book, viewing it as a vehicle for including students with disabilities in classes with their peers who do not have disabilities. In the first chapter, she discusses the process of deciding which technology has to be used in the regular classroom, the access needs of students with disabilities, and the importance of collaboration among educators in including children who need AT to participate fully. The second chapter takes a developmental perspective on AT, looking at its use with infants through adults with disabilities. The importance of long-range planning in AT service delivery is emphasized. The next chapter examines the use of AT according to different aspects of the life cycle, including language development, cognitive development, play and recreation, and environmental control. In the next two chapters, the process of integrating technology into the classroom is considered and the different ways in which activities using technology can impact the social development of students are discussed. The author explains the use of word processing, desktop publishing, database, spreadsheet, and telecommunications programs both in classroom activities and as tools to increase teacher productivity in the next two chapters. The next chapter gives a short overview of the use of multimedia authoring programs, such as HyperCard and Linkway, in designing individualized instruction. Then suggestions for implementing technology into individual education plans (IEPs) are provided, together with tips for collaborating with parents, and considerations about policy reform and dealing with change. Each chapter contains a list of activities in which readers may engage to make the content more salient.

This book would be especially helpful to professionals who are attending the process of school inclusion of children with milder disabilities, such as learning disabilities, behavior disorders, traumatic brain injuries, or attention deficit disorder. The book's focus may be too centered upon academics for those dealing with students with severe or profound disabilities. Examples of how general educational software can be used to adapt the curriculum and enhance students' learning is a major strength of the book.

MANDELSTAM M. *How to Get Equipment for Disability*. London: The Disabled Living Foundation, 1993.

Intended to be a practical book, this book describes how equipment is provided for people with disabilities in the United Kingdom. It explains the statutory framework and how the system works in practice, given that

equipment is provided through a variety of channels that are recognised to be complicated. The book is designed to assist a number of groups, among others: central and local government policy makers, medical and other prescribers of equipment, professional staff, voluntary bodies, manufacturers and suppliers of equipment.

PETIT B., MARTEAU D. *Ajoutez de l'aplomb aux années. Guide pratique*. IEIAS, 1993.

“Adding upright to the years, guidebook”.

Falls represent about 50% of the domestic accidents and apply more particularly to the elderly of more than 60 years old. To prevent them, the authors consider real-life experience of unfortunate falls. On the other hand, they give us a lot of advice both for the “maintenance of our bodily machine” and for house improvement.

SIMON L. *Polyarthrite rhumatoïde et économie articulaire*. Geigy, 1982.

“Rheumatoid polyarthritis and articular economy”.

This is a reference book for the professionals recalling the principles of articular economy and illustrating their applications. It also considers AT and the adaptations of the surrounding environment using the photos of some patients during the different activities of the daily life (toilet, dressing, rest, domestic activities, moving around, leisure activities).

TRACE RESOURCE BOOK 1996/97. *Assistive Technology for Communication, Control and Computer Access*. Madison: Trace Research and Development Center, 1996.

The Trace Research and Development Center from the University of Wisconsin-Madison (USA) publishes an important “Resource Book” every year listing products in Assistive Technology, namely in communication, control, computer access and special software. It is a useful resource book for people with disabilities, parents and rehabilitation professionals. For each product it provides a vendor's name, a few basic facts, a photograph (if available and relevant), and a short description of the product's functions and capabilities.

Each section of the book contains products designed for different basic purposes. Part 1 covers “Communication”, primarily aids to communication both electronic and non-electronic, as well as aids that supplement speech. Part 2 covers “Control”, including special switches, plus environmental control and calling devices. Part 3 covers “Computer Access”, listing products which provide access to computers for people with disabilities. It also lists special software written specifically for the needs of people with disabilities.

Special Indexes help find products that meet special needs. These indexes cover all the products listed in the Resource Book. Finally three appendices provide additional source of information: Appendices A and B give detailed information about “Newsletters and Journals”, “Service Centres for AAC and Computer Access”, “Service Providers and Organisations”, etc. Appendice C is a glossary of special vocabulary used in product description.

VILLALTA M.F. (Ed.). *Tecnologías de la Información y Discapacidad*. Madrid: FUNDESCO Colección Estudios y Documentos, 1988.

This book is the result of a Study promoted by FUNDESCO (Foundation for the Development of Communications of the Spanish PT) and Real Patronato, with the cooperation of more than twenty experts. Its goal is to know the state of the art, inside and outside Spain, in Information Technology (IT) and its influence over the life of people with disabilities. In the first chapter a description is made about the relation between disability and information technology. The second chapter addresses how in the more developed countries, IT is improving the quality of life of people with disabilities. The last chapters refer specifically to the situation in Spain, and the experiments done in this field in that country. Finally, Spanish research projects in this area are also described.

4.3 SELECTED FOR FURTHER READING

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DUPREZ F. *Les aides techniques informatisées pour tétraplégiques: étude de marche, conception et réalisation d'une aide technique*. Louvain-la Neuve: Mémoire UCL, 1987.

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SCHERER J.M. *Living in the state of stuck. How technology impacts the lives of people with disabilities*. Brookline Books, 1993.