



Ambient Assisted Living Country report - Italy

 <p style="font-size: 2em; font-weight: bold; color: blue;">AAL</p> <p style="color: blue;">AMBIENT ASSISTED LIVING</p>	<p style="font-weight: bold;">AAL</p> <p style="font-weight: bold;">Contract No. 004217</p> <p>Ambient Assisted Living Preparation of an Article 169 initiative</p>
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<p style="font-weight: bold;">Work Package 1</p> <p style="font-weight: bold;">Country report – Italy</p>	
Deliverable:	D 1
Preparation Date:	March 23 rd 2005
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Dissemination Level:	Restricted

Project type:	Specific Support Action
Duration:	01.09.2004 – 31.08.2006
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User Needs and Demands for AAL-Applications in Italy (Socio-cultural and Socio-economic Factors)

1.1 Introduction

In Italy the market of home technologies has grown significantly over the last few years. A new word has been recently created in the Italian language: “domotica”, composed by the Latin word “domus” (house) and the Italian word “automatica” (automatic). However “domotica” doesn’t only mean “home automation”, but generally indicates the knowledge and all innovative technologies (properly integrated) that can make a house “intelligent”.

In this report the technical solutions to achieve an “Ambient intelligence”, aiming at better life conditions of elderly and disabled people, are briefly named “AAL Technologies”.

As from 2001 some important initiatives have been carried out in Italy on Ambient Assisted Living, concerning the development of smart homes for elderly and disabled people.

The consumers’ associations are highly interested in these opportunities, but so far the use of new technologies by elderly and disabled people has been rather limited.

1.2 Use of new technologies in Italy

The report “L’Italia dell’e-family, 2004” (“E-family in Italy, 2004”), written by the Federcomin (Association of Italian ITC enterprises) and ANIE (Association of electric and electronic enterprises), states the rapid growth of new technologies in Italian houses over the last years, as well as the important consequences for the market and the social customs.

Table 1.2.1 shows the penetration rate of the main home technologies in Italian families from 1995 until 2003. In 2003 the 86% of Italian families had at least one mobile phone (the average data is 2,1 mobile phones per family), 51% of families had one personal computer at home and 34% an internet access.

	1995	1997	1999	2001	2003
<i>Personal computer</i>	14%	21%	27%	41%	51%
<i>Printer</i>	9%	16%	20%	34%	45%
<i>Scanner</i>	-	1%	6%	13%	21%
<i>Second personal computer</i>	-	0,8%	2%	4%	7%
<i>Modem</i>	0,3%	6%	9%	30%	38%
<i>Internet access</i>	0,2%	2%	5%	25%	34%
<i>ISDN access</i>	-	-	-	2,1%	2,4%
<i>Broad band</i>	-	-	-	0,9%	5,2%
<i>Dishwasher</i>	28%	32%	34%	38%	41%
<i>Microwave oven</i>	14%	17%	22%	28%	36%
<i>Air conditioner</i>	2%	4%	8%	15%	20%
<i>Mobile phones per family</i>	7%	25%	61%	79%	86%
<i>Second mobile phone per family</i>	0%	2%	21%	46%	55%

Source: Report 2004 Federcomin-ANIE

Table 1.2.1 – Penetration of new technologies in Italian families (1995 - 2003)

Table 1.2.2 shows the rapid market growth of home technologies in the year 2002-2003: +9,2% increase for mobile phones, +14,2% for PCs, +19,1% for internet. The new born digital technologies have had even higher growth rates: digital cameras +227%, DVD-Rom +80%, broad band +68%, DVD video +63%.

The Federcomin-ANIE 2004 Report states that the technological status in Italian houses is very similar to other European countries: with a leadership for mobile phones, a slightly higher penetration of personal computer and a lower penetration of internet.

Table 1.2.3 shows the growth of Italian family expenses for technologies and services (particularly for mobile phones, personal computers, internet and pay-TV) in the period 1995-2003: from 2,45 billion Euro in 1995 to 18,4 billion Euro in 2003 (+652%). In the year 2003 the increase of global expenses was +17% compared to 2002, that is equivalent to 1460 Euro/year per each Italian family.

The Federcomin-ANIE 2004 Report also indicates that a large part of the Italian families (8,6 million of families) is highly interested in the installation of monitoring systems for personal security and safety. The requirement concerns the following end users: elderly people (2,43 million of families), children (2,37 million of families), ill and disabled people (1,05 million of families). Other families (3,23 million) are interested but no declaration about the end users is made.

	<i>Growth rate 2002-2003</i>
<i>Mobile phones</i>	9,2%
<i>Personal computer</i>	14,2%
<i>Internet access</i>	19,1%
<i>Pay-TV</i>	3,6%
<i>Satellite dish</i>	16,1%
<i>Digital camera</i>	227%
<i>DVD Player</i>	80%
<i>Broad band</i>	68%
<i>DVD Video</i>	63%

Source: Report 2004 Federcomin-ANIE

Table 1.2.2 – Penetration of new technologies in Italian families (2002 - 2003)

	<i>1995 (Million Euro)</i>	<i>2002 (Million Euro)</i>	<i>2003 (Million Euro)</i>
<i>Mobile phones</i>	660	9650	10800
<i>Personal computer</i>	1500	2700	3700
<i>Internet access</i>	20	2100	2670
<i>Pay-TV</i>	270	1300	1260
<i>Total</i>	2450	15750	18430

Source: Report 2004 Federcomin-ANIE

Table 1.2.3 – Family expenses for new technologies in Italy

The Federcomin-ANIE 2003 Report provides data on the use of technologies by elderly people (in the 2004 report this data are not available). Only 5,9% of over 65 elderly people use a personal computer (Table 1.2.4), and only 2,4% of them is an internet user (Table 1.2.5).

<i>Age</i>	<i>Men (%)</i>	<i>Women (%)</i>	<i>Total (%)</i>
<i>0-10</i>	11,7	7,3	9,6
<i>11-14</i>	44,7	39,9	42,5
<i>15-17</i>	57,2	53,8	55,5
<i>18-24</i>	52,9	47,1	50,2
<i>25-34</i>	47,2	31,5	39
<i>35-44</i>	37,9	21,6	29,6
<i>45-54</i>	25,2	11,7	18,4
<i>55-64</i>	17,5	6	11,9
<i>Over 65</i>	9,8	2,2	5,9
<i>All ages</i>	31	20,1	25,6

Source: Report 2003 Federcomin-ANIE

Table 1.2.4 – PC users in Italy (2002)

<i>Age</i>	<i>Men (%)</i>	<i>Women (%)</i>	<i>Total (%)</i>
<i>0-10</i>	2,2	1,6	1,9
<i>11-14</i>	17,4	15,2	16,4
<i>15-17</i>	35,5	32,8	34,1
<i>18-24</i>	35,4	31,1	33,4
<i>25-34</i>	39	25,7	32
<i>35-44</i>	35,1	17,5	26,1
<i>45-54</i>	20,7	8,1	14,4
<i>55-64</i>	12,1	4,2	8,3
<i>Over 65</i>	3,7	1,1	2,4
<i>All ages</i>	22,5	13,8	18,1

Source: Report 2003 Federcomin-ANIE

Table 1.2.5 – Internet users in Italy (2002)

These results are similar to those collected by another survey carried out by the IRP CNR (CNR Institute on Population Research) in 2001. This survey states that elderly people have no difficulty in employing conventional household appliances, but great difficulties arise with information and communication technologies.

The reasons of this behaviour are mainly the following:

- elderly people have often the same problems of disabled people (great decrease of physical ability);
- the high cost of ICT devices is an obstacle, since many elderly people are in bad economic conditions;
- there are psychological barriers to approach information and communication devices.

These obstacles explain the data of Tables 4 and 5, but this situation can be quickly improved by means of social and political measures.

1.3 Public acceptance of AAL-applications

New technologies are not always accepted by elderly and disabled people, even if they offer advantages for safety and health. A very interesting case happened in the town of Trento (northern Italy), where the local Public Building Institute (ITEA - Istituto Trentino Edilizia Abitativa) has built many flats with AAL technologies for elderly people (fall detection systems, voice control devices, etc.). In the first group of flats they produced, elderly people didn't want to accept telecameras inside the rooms, because they were afraid of privacy violation. They accepted the installation only after verifying that that kind of telecameras were not able to register any recognizable images.

An effective role towards a better knowledge and an acceptance of new AAL technologies has been played by the Associations for disabled people that provide information on available technical aids and on the potentialities of innovation in this field. The main internet sites of these associations are (other web sites are indicated in chapter 6.2):

- www.siva.it: SIVA “means Assistive Technology Research and Information Centre”. It is a very complete portal on technologies for autonomy and social integration for disabled people, made by the Don Gnocchi Foundation.
- www.disabili.it: It is a portal with every kind of information for disabled people.
- www.asphi.it: Web site of the ASPHI Foundation. ASPHI means “Avviamento e Sviluppo di Progetti per ridurre l'Handicap mediante l'Informatica” (Starting up and development of projects to reduce handicap by means of information technologies).
- www.affarisocialihandicap.it/tematiche/tecnologie.asp: portal of the Ministry of Social Affairs, with many information on technologies for disabled people.
- www.ausilioteca.org: The “Ausilioteca” is a public service, created by the Administration of Emilia-Romagna Region, that provides consulting activities on technical aids for disabled people.
- Other important sites on the same subject are: www.centriausili.it, www.aiasbo.it, www.aidalabs.com, www.areato.org, www.superabile.it and others.

1.3.1 Activities that create awareness of AAL Applications

The awareness of AAL applications and the potential advantages for elderly and disabled people have greatly increased over the last years. The interest for this subject has grown especially from 2001, thanks to the following initiatives:

- Some research laboratories on AAL research (“Laboratori di Domotica”) have been created.
- The development of the market of home automation and the raising interest of industries for this market sector have produced co-operation activities with research centres and the growth of an “interest community” on this subject.
- Information initiatives (books, conferences, exhibitions, web sites) have been carried out (many sponsored by associations of disabled people).
- New training courses for technical experts have been organized.

1.3.1.1 Research Centres

Starting from 2001 the scenario has deeply changed thanks to some important initiatives. Agreements between Universities, Public Institutions and Industries gave rise to the creation of Research Centres on AAL technologies (Laboratori di Domotica) in Modena, Milano, Trento, Pisa, Rome:

- **Laboratorio Imagelab** at the University of Modena and Reggio Emilia, Engineering Faculty. An important project called “Domotica per disabili” has been carried out, financed by the Foundation Cassa di Risparmio di Modena.
- **Laboratorio di Domotica** created by the Foundation Politecnico di Milano (Technical University of Milan) and Merloni Elettrodomestici.
- **Intelligent building EDO** (ENEA Casaccia - Roma), in the Research Centre ENEA, Rome.
- **TBM-Lab Bio-medical technologies Laboratory at the Technical University of Milan**. Opened in 2003, to carry out research on e-health, human machine interface and other AAL technologies.
- **Laboratorio di Domotica** in Modena, opened in 2001, was realised by ProMo (Society for the promotion of economy in Modena), along with Democenter, Centro Ricerche di Carpi, Enea, Quasco, ICIE, and other industries and associations.
- **Domotics Lab** of the ISTI CNR (Pisa) Institute of Information Science and Technology (<http://domoticslab.isti.cnr.it>).

1.3.1.2 Initiatives of institutions and industries

The development of the home automation market has deeply increased the interest of Public Institutions and Industries. Some important initiatives are:

- **Laboratorio di Domotica in Florence**, created in 2004 by Firenze Tecnologia (Company of the Chamber of Commerce of Florence) and Cna Florence. This is not a research laboratory but a community of enterprises, institutions, associations, research centres and experts that promotes pilot projects and activities to create awareness on home automation technologies.
- **“Progetto Dimensione Casa Onlus - Casa più sicura”**, it is a project, with an operating centre in Bergamo, to promote home technologies with social purposes (activities are information, education, technology transfer, applied research).
- **C.E.T.A.D.** - Centro Eccellenza Tecnologie per Anziani e Disabili (Center of excellence on technologies for elderly and disabled people). Situated in the Environment Park in Turin, it is a technological centre for information and technology transfer on rehabilitation and social integration of elderly and disabled people.

- **Laboratorio "Casa Domotica"**, opened in 2003, in co-operation between Scuola Domotica and Eurosatellite. It is a demonstrative laboratory, used also for training courses.
- **Polo multifunzionale per la disabilita'**, (Multifunctional Centre for disability), opened in 2003 in Bologna by the Regional Centre for Technical Aids (Centro Regionale Ausili) and Ausilioteca, for helping disabled people to find technical solutions to live better at home.
- **"La casa intelligente", Faenza**. It is a smart home with the most innovative available technologies, built by some industries like Aurora, Bticino, Cisa and many others.
- **Laboratorio ESLab**. It is a smart building for research and innovation, opened in Reggio Emilia by the SMEs consortium Coimex United Companies, composed by many industries, like Smeg, Immergeas, Sistema Casa, General Electric - Nuovo Pignone and many others.

1.3.1.3 Information

Over the last few years many conferences and exhibitions on AAL have been organised, many internet sites have been created (see chapter 6.2 for an overview) and these subjects have been discussed on newspapers and TV.

The most important exhibitions in Italy on AAL technologies for elderly and disabled people are:

- Handimatica (www.handimatica.it): it is an exhibition-conference on technologies for disabled people, that takes place in Bologna every two years, organized by the ASPHI Foundation. Handimatica means Handicap + informatica (information technologies).
- Ability (www.ability-tecnhelp.it) is the exhibition on technologies and voluntary service. Tecnhelp is the exhibition on technology aids for elderly and disabled people. Both shows take place in Turin every year.
- Settimana della Domotica (Week of AAL Technologies), organized every year in June in Modena by ProMo and Democenter.

Among the conferences on AAL technologies for elderly and disabled people, organized in Italy in the period 2001-2005, it is worth mentioning:

- Conference "Ergonomia e progetto per utenza debole" ("Economy and design for weak users"), Milan, 22nd February 2005, Politecnico di Milano.
- Conference "Il mercato delle tecnologie intelligenti negli edifici" ("The market of smart technologies for buildings"). Results of the project EUSAVE SMART-ACC (Acceleration of Smart Building Technologies and Market Penetration), Modena, 18th February 2005, organized by ProMo and Enea.
- Conference "Domotica. Tecnologia al servizio dell'utenza ampliata. Soluzioni per il benessere e la sicurezza delle persone svantaggiate" ("AAL technologies for disabled users"), Dalmine, 29th October 2004, organized by the University of Bergamo, and Cesac (Centro Servizi per l'associazionismo, la cooperazione e le imprese sociali).

- Conference “La domotica ed il ruolo dell’ente locale” (Home automation and the role of Public Institutions), Pontassieve, 28th October 2004, organized by Firenze Tecnologia.
- 2° National Conference “Tecnologie ed economia della domotica: L’uso razionale dell’energia nelle abitazioni domotizzate” (Technology and economy of home automation. Rational energy use in smart homes), Pavia, 20th September 2004, organized by AEIT, ASTRI, ANIE, Univ. Pavia, Dip. Ing. Elettrica.
- Conference “La domotica per il risparmio energetico” (Home automation and energy saving), Scandicci, 1st July 2004, organized by Agenzia Fiorentina per l’Energia, Firenze Tecnologia, Ordine degli Ingegneri di Firenze and CNA Firenze.
- Conference “La domotica per anziani e disabili” (AAL for elderly and disabled people), Modena, 8th June 2004.
- Conference “Spazi tecnologici per l’uomo: le sfide della domotica” (Technological spaces for men: the challenge of home automation), Milan, 17th May 2004, Fondazione Politecnico di Milano.
- Conference "La Domotica: a cosa serve e quanto costa" (Home automation: purposes and costs), 6th March 2004, Fiera di Padova.
- Conference, “Tecnologie e disabilità, intervenire per ridurre l’handicap” (Technologies and disability: solutions to reduce handicaps), Modena, 11-13 December 2003, conference on the project “Domotica per disabili” (www.modenadisabili2003.unimo.it).
- Conference “Domotica e convergenza domestica: problemi e prospettive” (Home automation: problems and trends), Fiera di Vicenza - Satexpo, 2nd October 2003.
- Conference “Domotica, Office e Building Automation - Nuovi scenari dell’automazione in campo edilizio” (New scenarios of home automation), Milan, 19th September 2003.
- Conference "Innovazione per migliorare la qualità dell’abitare: ANIE presenta HOMEVOLUTION" (Innovation to improve home living quality, ANIE presents Homevolution), at the exhibition INTEL 2003, 20/24 May 2003, Milan.
- “Giornata di studio sulla domotica” (Conference on AAL technologies), Parma, 4th April 2003, Faculty of Engineering – University of Parma.
- Conference “Verso una casa da vivere: idee ed esperienze su domotica e disabilità” (Ideas and experiences on AAL for disabled people), at the exhibition HANDImatica, Bologna, 29th November 2002.
- Conference “Tecnologie ed Economia della Domotica” (Technology and economy of home automation), Università Cattolica del Sacro Cuore in Piacenza, 11th October 2002.
- Conference “Verso la casa intelligente” (Towards an intelligent home), Trento, 25th October 2002, Sala della Regione (www.itea.tn.it).
- Conference “Gli edifici intelligenti: risparmiare energia con la domotica” (Smart buildings: how to save energy), Modena, 18th October 2002, at Expoenergy 2002, organized by ProMo and Democenter.

- Conference “Tecnologie ed Economia della Domotica” (Technology and Economy of home automation), 11th October 2002, Università Cattolica del Sacro Cuore, Piacenza.
- “Giornata di studio sull'uso sociale della domotica” (Workshop on social use of home automation), Brignano (Bg), 29th April 2002.
- Conference “La domotica business del futuro” (Home automation business of the future), Modena, 7th March 2002, organized by ProMo.
- Conference “Qualità dell’abitare e domotica” (Quality of living and home automation), Modena, 28th February 2002.
- Exhibition “La sicurezza degli anziani negli ambienti abitativi” (Security and safety of elderly people at home), Genova, November 2001, organized by Promo.
- Conference “Automazione e robotica al servizio dei disabili motori” (Automation and robotics for mobility disablement), Modena, organized by Democenter and SIRI (Associazione Italiana di Robotica e Automazione), 10th October 2001.
- Conference “La casa intelligente, le nuove tecnologie per il terzo millennio: edilizia e domotica” (Smart home: the new technologies for the third millennium: house building and home automation) , SAIE Salone internazionale dell’industrializzazione edilizia, Bologna, October 2001, organized by Promo.

1.3.1.4 Education

The growing awareness of the opportunities of the new market on home technologies has produced an increasing offer of training courses for graduated and technical experts.

The post-graduate courses aim at the training of experts able to design and integrate all installations in a “smart system” (“System integrator”). The courses of the Laboratorio di Domotica in Modena have this goal.

An European Leonardo project called “Domus novo” has been dedicated to the training in the field of home automation (started in 2002, Italian partner: Sinergie, other partners: Spain, Denmark, France). In these countries the professional figure “Building Automation and System integrator”, with an intermediate knowledge between a technician and an engineer, is lacking and conventional schools are not updated to form such professionals.

(internet site: www.domusnovo.com).

Among the training courses in Italy on AAL applications, the following ones are worth mentioning:

- Course on “Ausili per l'ambiente e la mobilità” (Assistive technologies for home environment and mobility), at the Technical University of Milan, Faculty of Engineering, Degree in Biomedical Engineering.
- Course on “Design per la casa intelligente” (Design for the smart home), at the Technical University of Milan, Faculty of Architecture, prof. Pierluigi Molinari.
- Master in “Tecnologie per la qualità della vita” (Technologies for life quality), organized by the Faculty of Educational Science at the University of Bologna. This Master started in March 2005 for a one year duration and is organized in co-operation with ASPHI and Didacta Onlus and refers to the AAATE (Association for the Advancement

of Assistive Technology in Europe). The goal is the training of experts in Assistive Technologies.

- “Master in Assistive Technology - Ausili per l’utenza ampliata” (Technical aids for all users), organized by the Faculty of Engineering of the University of Trieste. It deals with assistance and life quality for elderly and disabled people, according to the “design for all” approach.
- Course of “Disability manager”, for 15 experts in assistive technologies for disabled people (march-october 2005), organized by the Regional Institute on Social Studies and Researches of Trento.

1.4 The structure of the social security and health system

Although the Italian State pays many different categories of benefits, the following explanation is limited to old-age pensions and disability pensions. This scheme gives the eligibility requirements for Italian Social Security benefits.

<i>TYPE OF BENEFIT</i>	<i>ELIGIBILITY REQUIREMENTS</i>
<i>Old-Age pensions</i>	Age 60 for men and 55 for women (from 1st January 1994 the retirement age increased to 61 for men and 56 for women and continued increasing 1 year every 2 years until January 2002 when it reached 65 for men and 60 for women). 15 years of contributions (from 1st January 1993 the contribution requirement increased to 16 years and continued increasing 1 year every 2 years until January 2001 when it reached 20 years). Not working (not applied if a person is self-employed). NOTE: An early retirement benefit is payable at any age with 35 years of coverage.
<i>Disability</i>	He has not reached retirement age unless only partially disabled and continuing to work. 5 years of contributions with at least 3 years in the last 5 years. Permanently and totally disabled (partial disability with 2/ 3 reduction of working capacity).
<i>Spouse</i>	Spouse's supplement paid to retired or disabled worker with a dependent wife or disabled husband.
<i>Child</i>	Child's supplement paid to retired or disabled worker with a dependent child who is under 18 years old (or under 22 and attending middle or vocational school, or under 26 and attending university) or disabled (regardless of age). NOTE: Child's supplement paid up to 26 years old only applied to children of self-employed workers.

Table 1.4.1 shows the number and the average annual amount of “disability pensions” and “old-age + disability pensions” (people with two pensions) in Italy in 2003.

	<i>All types of pensions</i>	<i>Disability pensions</i>	<i>Old age + disability pensions</i>
<i>Total number</i>	16.367.101	1.282.013	1.524.747
<i>Number of pensions for people over 65</i>	10.964.302	598.104	1.293.024
<i>Average annual amount (euro)</i>	12.039,45	4.965,88	15.202,84

Table 1.4.1 – Number and amount of disability pensions in Italy, 2003.

1.4.1 Benefits for AAL-Applications

Technical aids for disabled and ill people are paid (100%) by the National Health Service if included in the Decree of the Ministry of Health n.332/1999, that makes a list of all technical devices provided by the State free of charge. Obviously, AAL applications are not included in this list, but they could be considered in the future, particularly for seriously disabled people. Moreover, the Law 669/1996 provides some facilities to buy technical aids and information systems (also computers) when they can help autonomy of disabled people. The Law defines the technical aids as “devices based on mechanical, electrical or information technologies, made to help rehabilitation, personal relationships, communication, environment control and access to information and culture for people whose functions are limited or prevented by mobility or sensitive disablement”. Therefore, also computers, modems, fax and AAL devices and installations are potentially included. Two types of benefits are provided:

- A lower VAT (4% instead of 20%) is applied to the purchase price.
- In the annual income tax return it is possible to apply a tax deduction corresponding to the 19% of the purchase cost for these products.

1.4.1.1 Regional benefits

The Province of Trento decided in March 2004 to pay contributions for the installation of AAL technologies in the flats for elderly people of the ITEA Public Building Institute (3300 Euro max contribution for safety devices and 9000 Euro max contribution – 80% of the cost - for personal aid devices). The following table summarizes the benefits given by the Regional Governments in addition to the State benefits (for more information see: www.handylex.it).

<i>Regions</i>	<i>Beneficiary</i>	<i>Type of device</i>	<i>Contribution</i>
<i>Abruzzo</i>	Disabled people	Technical aids, information technologies, custom-made furnitures	20% of the cost
<i>Basilicata</i>	Disabled people	removal of architectural barriers	up to 75% of the cost and up to 15490 Euro. For information technologies up to 50% of the cost and up to 1000 Euro. For home technologies 50% of the cost.
<i>Emilia Romagna</i>	Disabled people	removal of architectural barriers and technical aids	50% of the cost up to 12,500 Euro. Cost limit is 10000 Euro for technical aids.
<i>Lombardia</i>	Disabled people	technical aids	80% of the cost up to 15000 Euro
<i>Marche</i>	Disabled people	removal of architectural barriers and technical aids	up to 27500 Euro
<i>Provincia di Bolzano</i>	Disabled people	removal of architectural barriers	between 30 and 80% of the cost (depending on the income), up to 60000 Euro
<i>Provincia di Trento</i>	Disabled people	removal of architectural barriers	up to 100% of the cost, depending on the income
<i>Valle d'Aosta</i>	Disabled people Elderly people 65+	removal of architectural barriers and technical aids	between 30% and 100% depending on the income
<i>Veneto</i>	Disabled people, institution, industries	removal of architectural barriers and technical aids to overcome barriers	Building Intervention up to 50% of the cost and up to 7500 Euro for technical aids max contribution 5000 Euro

1.5 Statistical data on elderly and disabled people in Italy

1.5.1 Demographic overview

Official figures of the Italian Institute of Statistics (ISTAT) show an Italian population of 57.3 million inhabitants in 2003, and 10.9 million of over 65 elderly people (Table 1.5.1). Then, 19% of the Italian population is older than 65 (in Europe nearly 14%).

	<i>Males</i>	<i>Females</i>	<i>Total</i>
<i>Italian population</i>	27.766.223	29.554.847	57.321.070
<i>Over 65</i>	4.486.554	6.414.595	10.901.149
<i>% Over 65/Total</i>	16,20%	21,70%	19,00%

Source: ISTAT (Italian Institute of Statistics)

Table 1.5.1 – Population in Italy (1st January 2003)

The percentage of elderly people in Italy is one of the highest in the world: only Japan has a higher percentage of over 60 and only Sweden has a higher percentage of over 75 (Table 1.5.2). Italy is also the second country in the world (after Japan) with respect to the lowest percentage of young people (only 14.4% of under 15).

	<i>Age</i>		
	<i><15</i>	<i>>60</i>	<i>>75</i>
<i>Italy</i>	14,4%	24,2%	8,0%
<i>Japan</i>	14,2%	24,9%	7,9%
<i>Sweden</i>	18,0%	19,6%	9,0%

Table 1.5.2 – Countries with the higher percentage of elderly people in the world, 2003

Figure 1.5.1 and Tables 1.5.3, 1.5.4 and 1.5.5 show the Italian population as a function of age and sex. The number of elderly people is very high, especially in big towns of central and northern Italy (Table 1.5.6).

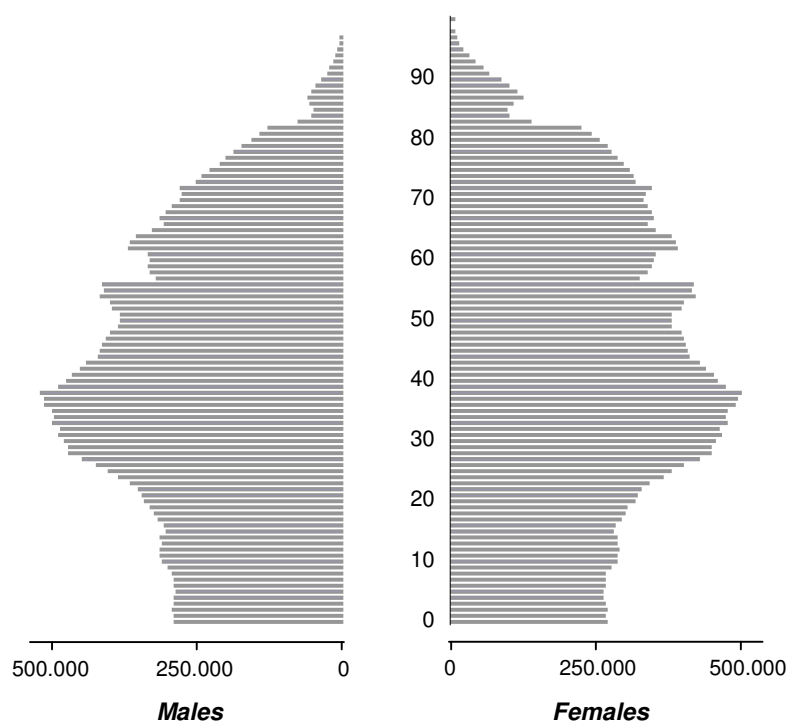


Figure 1.5.1 - Population in Italy (1st January 2003)

	0-19 years old	20-64 years old	65+ years old	Average population Age
ITALY	19,30%	61,70%	19%	42,2
Northern Italy	17,10%	62,70%	20,20%	43,6
Central Italy	17,60%	61,80%	20,70%	43,5
Southern Italy	22,90%	60,50%	16,60%	39,7

Table 1.5.3 - Age of Italian population (1st January 2003)

	0-19 years old	20-64 years old	65+ years old	Average population Age
ITALY	20,40%	63,40%	16,20%	40,6
Northern Italy	18,10%	65,10%	16,80%	41,8
Central Italy	18,70%	63,40%	17,90%	41,9
Southern Italy	24,20%	61,40%	14,50%	38,4

Table 1.5.4 - Age of Italian population - MALES (1st January 2003)

	0-19 years old	20-64 years old	65+ years old	Average population Age
ITALY	18,20%	60,10%	21,70%	43,7
Northern Italy	16,10%	60,50%	23,50%	45,3
Central Italy	16,50%	60,30%	23,20%	45
Southern Italy	21,80%	59,60%	18,60%	40,9

Table 1.5.5 - Age of Italian population - FEMALES (1st January 2003)

	<i>0-19 years old</i>	<i>20-64 years old</i>	<i>65+ years old</i>	<i>Average population Age</i>
Torino	15%	61,90%	23,10%	45,5
Milano	14,50%	62,10%	23,50%	45,8
Firenze	14%	59,90%	26,10%	47,3
Roma	17,30%	63,10%	19,50%	43,2
Napoli	23,40%	60,90%	15,80%	39,2

Table 1.5.6 - Age of population in the big Italian towns (1st January 2003)

Table 1.5.7 shows some interesting demographic parameters: birth and death rate, migratory net rate, natural and total population growth. The natural growth in Italy is negative, but the total growth is positive, due to a positive migratory rate.

	<i>Birth Rate</i>			<i>Death Rate</i>			<i>Natural Growth</i>			<i>Migratory Net Rate</i>			<i>Total Growth</i>		
	<i>2001</i>	<i>2002</i>	<i>2003</i>	<i>2001</i>	<i>2002</i>	<i>2003</i>	<i>2001</i>	<i>2002</i>	<i>2003</i>	<i>2001</i>	<i>2002</i>	<i>2003</i>	<i>2001</i>	<i>2002</i>	<i>2003</i>
ITALY	9,4	9,4	9,4	9,6	9,8	10,1	-0,2	-0,3	-0,7	n. d.	6,1	10,5	n. d.	5,7	9,8
Northern Italy	9	9,1	9,1	10,3	10,4	10,7	-1,3	-1,3	-1,7	n. d.	9,4	13,8	n. d.	8,1	12,2
Central Italy	8,7	8,9	8,9	10,2	10,3	10,7	-1,5	-1,4	-1,8	n. d.	7,8	14,6	n. d.	6,4	12,9
Southern Italy	10,3	10,1	10,1	8,5	8,7	9,1	1,8	1,4	1	n. d.	1	4,1	n. d.	2,4	5,1

Table 1.5.7 – Italian population data

Table 1.5.8 shows the number of sons per woman (1.3 sons/woman in 2003, one of the lowest rates in the world), and life expectancy (77 years for men and 82.9 for woman in 2002, one of the highest rates in the world). Table 1.5.9 shows that the situation in the past was very different.

	<i>Number of sons per woman</i>			<i>Life Expectancy</i>			
	<i>2001</i>	<i>2002</i>	<i>2003</i>	<i>2001</i>		<i>2002</i>	
				<i>Males</i>	<i>Females</i>	<i>Males</i>	<i>Females</i>
ITALY	1,23	1,27	1,3	76,7	82,8	77	82,9
Northern Italy	1,18	1,23	1,25	76,6	83,1	76,8	83,1
Central Italy	1,13	1,2	1,23	77,1	83	77,4	83,1
Southern Italy	1,33	1,33	1,35	76,6	82,2	76,8	82,3

Table 1.5.8 – Italian population data

Years	Males	Females	M+F
1921-22	49,3	50,8	50
1930-32	53,8	56	54,9
1950-53	63,7	67,2	65,5
1970-72	69	74,9	71,9
1983	71,1	77,9	74,5
1995	74,6	81	77,8

Table 1.5.9 – Historical survey on life expectancy in Italy

ISTAT Population forecasts up to 2050 (Table 1.5.10) show a stable population (high hypothesis) or a decreasing trend (low or medium hypothesis). It is very interesting that in all cases the percentage of elderly people in 2050 will be about 1/3 of the total population (ranging from 33.29% to 36.01%). Forecasts also show that in Europe elderly people older than 65 will be about 28% in 2050.

	Population growth hypothesis - Low					
	2005	2010	2020	2030	2040	2050
All ages	57.901.430	57.542.922	55.392.447	52.388.616	48.561.224	43.650.346
Over 65	11.300.640	11.937.613	13.203.031	14.842.063	16.581.012	15.716.595
% Over 65/Total	19,52	20,75	23,84	28,33	34,14	36,01
	Population growth hypothesis - Medium					
	2005	2010	2020	2030	2040	2050
All ages	58.241.860	58.565.211	58.123.359	57.063.208	55.292.447	52.253.493
Over 65	11.335.217	12.065.421	13.720.816	15.979.145	18.366.906	17.973.071
% Over 65/Total	19,46	20,60	23,61	28,00	33,22	34,40
	Population growth hypothesis - High					
	2005	2010	2020	2030	2040	2050
All ages	58.578.601	59.542.062	60.712.208	61.594.353	61.932.054	60.972.887
Over 65	11.370.220	12.192.909	14.223.895	17.066.956	20.111.082	20.297.053
% Over 65/Total	19,41	20,48	23,43	27,71	32,47	33,29

Table 1.5.10 – Population in Italy – Forecasts until 2050

Table 1.5.11 shows an estimation of non self sufficient elderly people in Italy (8.2% of over 60 and 29% of over 80 in 2004).

	2001	2004	Growth 2001-2004 (%)
Over 60 elderly people	6,7%	8,2%	22,4%
Over 80	9,4%	29%	208,5%

Source: Survey Censis - La Repubblica, 2004

Table 1.5.11 – Non self sufficient elderly people in Italy, 2004

1.5.2 Disabled people in Italy

1.5.2.1 *Number of disabled people*

It is somewhat hard to estimate the precise number of disabled people in a country, because the definition of disability is not universal. It may vary according to the type of statistical survey, leading to an imprecise usage of terms such as disabled, invalid, and so forth. For example, disability and invalidity are different concepts: the former describes the capacity to conduct autonomous activities (even with various aids) fundamental to daily life (and relates to the Italian Law n. 104/92). The latter concerns the right to economic benefits in consequence of a biological malfunction (which is covered by the Law 118/71). The Italian Institute of Statistics uses the definition of disability proposed by the World Health Organisation in the International Classification of Disablement, Disability and Handicap (1980): “disablement” is the biological damage due to illness or accident; “disability” is the inability to perform normal activities as a consequence of disablement; while “handicap” is the social disadvantage resulting from disability. For instance, a person on a wheelchair is certainly disabled, but would not be handicapped if all architectural barriers in the world were completely eliminated. Obviously in this definition, it is possible to estimate the number of disabled, but not the number of handicapped people: handicap is subjective and also depends on life expectations.

Another important point to focus on is that the precision of the survey depends on the type of disability. It is much more difficult to gather data on mental than physical disability, due to the cultural prejudice which inhibits people to reveal such conditions. However, ISTAT surveys give fairly precise information on disabilities of the elderly people.

ISTAT estimates 2,615,000 disabled people in Italy, about 5% of the over 6 population living in a family (Table 1.5.12). This figure is based on a very restrictive concept of disability, as it considers only disabled people who declared a total absence of autonomy in at least one fundamental function of daily life.

Considering people who showed a “significant difficulty” in doing these functions, the figure increases up to 6.980.000 people, that corresponds to 13% of over 6 years old Italian population living in family. This figure doesn't include people who can carry out fundamental activities even if they suffer from mental disability.

The survey also estimate 165.538 disabled and un-self sufficient elderly people living in State nursing homes (Table 1.5.13).

Taking into account both disabled people living in the family and those in nursing homes, we have a figure of about 2.800.000 disabled people. This figure could be underestimated because of the difficulty in gathering data on mental disabled people.

Disability is obviously correlated to age: 19.3% of the 65+ population are disabled, while at 80yrs+ the figure is 47.7% (38.7% for men, 52% for women). Women represent 66% of disabled people and men only 34%, while in relation to the whole population 6.2% of women, and about 3.4% of men, are disabled.

	<i>Disabled people - Age groups</i>						<i>Total</i>
	<i>6-15</i>	<i>15-24</i>	<i>25-44</i>	<i>45-64</i>	<i>65-74</i>	<i>>75</i>	
<i>Males</i>	40.000	27.000	81.000	153.000	204.000	389.000	894.000
<i>Females</i>	40.000	32.000	82.000	209.000	323.000	1.035.000	1.721.000
<i>Males and Females</i>	80.000	59.000	163.000	362.000	527.000	1.424.000	2.615.000

Source: ISTAT, Survey on health conditions and health assistance, 1999-2000.

Table 1.5.12 - Disabled people in Italy (over 6 years old) - Year 2000

	Disabled people		Un-self sufficient elderly people	Total
	<18 years old	18-64 year old		
Males	1.050	14.836	30.721	46.607
Females	841	13.154	108.558	122.553
Males and Females	1.891	27.990	139.279	169.160

Source: ISTAT, survey on Nursing Homes, 2000

Table 1.5.13 - Disabled and elderly people in nursing homes - Italy, year 2000

1.5.2.2 Type of disability

In the ISTAT survey on health conditions 4 types of disability are identified: “individual confinement” (to bed, or to a chair -not a wheelchair- or in the house), “functional disablement” (e.g. difficulty in dressing, washing, having a bath, eating without help), “mobility disablement” (e.g. difficulty in walking, climbing stairs, going to bed, sitting down without help), “sensorial disablement” (difficulty in hearing, seeing, or talking) (Tables 1.5.14, 1.5.15, 1.5.16).

The most severe disability type is confinement. This entails permanent restriction to bed or a chair, with virtually no autonomy, or indoor confinement due to physical or psychological obstacles. About 2.1% of 6+ population is confined in this way, with the figure rising to about 25% for those over 80 (about 19% of men and 28% of women). Around 2.9% of over 6 population has difficulty in performing normal daily activities (problems related to personal care: dressing, eating food, washing hands, etc). Around 12% of 75-79 years old people have this difficulty, and so they need help in these activities; around 1/3 of the over 80 population cannot perform basic daily activities. Around 2.2% of over 6 population suffers from mobility disablement: percentages become significant above the age of 75 (9.9% of 75-79 years old people and 22.5% of those over 80: 17.6% men, 24.8% women) affected. Difficulties in communication, that is seeing, hearing or talking, affect around 1% of the over 6 population.

Analysis of data on permanent invalidity reveals a figure of about 352,000 people with partial or total blindness¹, while 877,000 suffer from hearing problems², and 92,000 people are deaf-mute³. 33% of disabled people suffer contemporarily from at least two disabilities of functional, locomotory and sensorial types. Among these, 33% are males and 67% females. This difference is due to the different age distribution of men and women: about 80% of people with more than one disability are in fact over 65.

	Males	Females	Total
Individual confinement	344.000	809.000	1.153.000
functional disablement	516.000	1.039.000	1.555.000
mobility disablement	383.000	821.000	1.204.000
sensorial disablement	245.000	355.000	600.000
Total(*)	894.000	1.721.000	2.615.000

(*) the total does not correspond to the sum of each group because one person can be affected by more disabilities.

Table 1.5.14 - Disabled people in Italy - Type of disability, year 2000

¹ Total or partial absence of vision up to less than one twentieth after any correction. These data are valid for all age groups, not only for 6+ people.

² Total or partial lack of hearing even with use of hearing aids. These data are valid for all age groups, not only for 6+ people.

³ Complete inability or severe difficulty in communication using speech. These data are valid for all age groups, not only for 6+ people.

MALES	Age groups						
	<15	15-44	45-64	65-74	75-79	>80	Total
<i>Total</i>	1,49%	0,87%	2,17%	7,89%	14,38%	38,66%	3,41%
<i>Individual confinement</i>	0,27%	0,32%	0,74%	2,41%	6,06%	19,10%	1,31%
<i>functional disablement</i>	1,17%	0,45%	0,97%	3,89%	8,74%	27,07%	1,97%
<i>mobility disablement</i>	0,13%	0,25%	0,98%	3,94%	6,55%	17,61%	1,46%
<i>sensitive disablement</i>	0,24%	0,27%	0,66%	1,85%	3,46%	11,78%	0,94%

FEMALES	Age groups						
	<15	15-44	45-64	65-74	75-79	>80	Total
<i>Total</i>	1,63%	0,94%	2,86%	10,16%	22,99%	52,02%	6,19%
<i>Individual confinement</i>	0,43%	0,49%	1,18%	4,07%	10,10%	27,80%	2,91%
<i>functional disablement</i>	0,98%	0,40%	1,03%	5%	13,81%	39,19%	3,73%
<i>mobility disablement</i>	0,22%	0,25%	1,41%	5,42%	12,06%	24,86%	2,95%
<i>sensitive disablement</i>	0,23%	0,25%	0,49%	1,45%	3,59%	13,43%	1,28%

MALES and FEMALES	Age groups						
	<15	15-44	45-64	65-74	75-79	>80	Total
<i>Total</i>	1,56%	0,91%	2,53%	9,14%	19,57%	47,67%	4,85%
<i>Individual confinement</i>	0,35%	0,41%	0,96%	3,33%	8,49%	24,97%	2,14%
<i>functional disablement</i>	1,08%	0,43%	1%	4,50%	11,80%	35,24%	2,88%
<i>mobility disablement</i>	0,17%	0,26%	1,20%	4,75%	9,88%	22,50%	2,23%
<i>sensitive disablement</i>	0,24%	0,27%	0,57%	1,63%	3,54%	12,89%	1,11%

Table 1.5.15 - Type of disability, percent of the whole population in each age group, year 2000

	Over 65 disabled people		
	Males	Females	Total
<i>Total</i>	14,25%	22,89%	19,33%
<i>Individual confinement</i>	5,89%	11,01%	8,90%
<i>in bed</i>	1,35%	2,20%	1,85%
<i>on a chair</i>	1,38%	2,45%	2,01%
<i>at home</i>	3,17%	6,37%	5,05%
<i>functional disablement</i>	8,68%	15,02%	12,40%
<i>mobility disablement</i>	6,71%	11,49%	9,52%
<i>sensitive disablement</i>	3,80%	4,74%	4,36%

Table 1.5.16 – Type of disability, percent of the over 65 population, year 2000

1.5.2.3 Health, assistance and social conditions

Health and assistance

State of health and health services are very important for the integration of disabled people. The lack of adequate assistance or rehabilitation routes increase handicap. Health services for disabled people requires great economic and structural resources.

The main figures on health and assistance⁴ of disabled people in Italy are:

- Disabled people go the doctor 3 times more often than the non disabled, and are four times more likely to be admitted to hospital.
- 19.1% of disabled people under 25 say they feel quite well, while 68.3% say they feel well or very well. In the age group 25 - 44, 62.1% say they feel quite well or well.
- 19.3% of people over 65 are disabled, they represent 63% of the total number of disabled people.
- The cost of rehabilitation, integration, and residential assistance for mentally and physically disabled people was about 2,789 million Euro in 2001, about 4.4% of total health spending.

Households

Talking about social integration of disabled people also involves discussion of the family context the disabled person lives in. The role of the family is fundamental in many aspects of the life of a disabled person, from assistance to social life.

The main figures on households of disabled people⁵ are:

- 28% of the people with disabilities live alone, compared to 8% of non disabled people. Most of them are women or widows. The average age of the disabled living alone is 76 for men and 80 for women.
- Disabled elderly women can count on the presence of their children, who live in the vicinity (82% of the cases) and pay a visit at least once a week in 87% of the cases.
- Among young people, the condition of being disabled implies their remaining in the household of origin; one therefore finds that 34% of the disabled with the age 25-44 live with their parents (compared to 19% among non disabled individuals), and 17% of the disabled of the same age lives with a single parent (compared to 6% among the non disabled).
- The household remains an essential point of reference for disabled people: 74% of the aids received by disabled people are given by a more or less close relative and, among these, 41% are female relatives.

Social Life

Social participation is the greatest challenge for disabled people. They not only must face up with the problems deriving from their disability, but also those related to their culture and environment. The main figures on social life of disabled people⁶ are:

⁴ **Data sources:** Survey "Health Conditions and Recourse to Health Services" (ISTAT, 1999-2000), "National Health Service Information System" (Ministry of Health, 2001).

⁵ Data source: Survey "Health conditions and Access to Health Services" (ISTAT, 1999-2000).

- 18% of disabled people under 44 read a newspaper almost every day (25% non disabled).
- About 67% of disabled people between 18 and 44 listen to the radio, and 90% watch television almost every day (79% and 94% non disabled).
- 39% follow Italian politics (58%).
- 22% of disabled people under 44 have been to the cinema, theatre or to see some type of show within the last 12 months (38%).
- 19% read books.
- 24,9% of disabled people practise a sporting activity. Of these, 51,7% are from 6 to 44 years old.
- From 1989 to 1997 there was a 5.3% increase in members of the Federation of Disabled Sport. The increase in the number of sports clubs was the same.
- 84% of disabled people are satisfied with their family relationships (91% non disabled).
- There is little difference between disabled and non disabled people for satisfaction with free time activities: 56% against 64% say they are satisfied.
- 66% of disabled people are happy with their relationships with friends (85% non disabled).

⁶Data sources: "Survey on sporting activity of the Italian Federation of Disabled Sports for data on competitive sporting activity"; Survey "Health Conditions and Access to Health Services" (ISTAT, 1999-2000), Survey "Aspects of Daily Life" (ISTAT, 2000).

1.6 Market structure

In Italy the turnover in the year 2002 of the industrial “home and building automation” sector was 12,260 million Euro. According to forecasts, the turnover is expected to increase up to 13,745 million Euro in 2005 and 15,700 million Euro in 2008 (Source: ANIE- Allaxia).

In Italy 1,5 million houses (or flats) will be built in the next 10 years, 2,5 million houses will be completely renovated and about 8 million upgraded, about 3,5 million new home automation systems are expected to be installed. This economic activities will correspond to a whole turnover of about 8,5 billion Euro.

Over the last few years the use of technology in Italian houses has greatly increased (see chapter 1.2). The market of home automation systems has also increased, but not so much as some surveys of the late '90 forecasted. Nowadays, the supply of home automation systems is directed to well-off people with high technical interest.

A recent survey of the Smau Comufficio (Association of delivery enterprises in the field of electronics) and the Catholic University of Milan says that young people (particularly singles) are highly interested in home technologies, in order to have a more practical home management. Older people (over 50) are also interested, but with a different motivation: in fact they indicated elderly and disabled people as optimal users. The main requirements and expectations are safety, security and a better life quality. The consumers' trend looks quite positive, but many people are doubtful of the reliability of these systems.

This sector has prospects of success, though the taking off is rather difficult. The main reasons are (source: Sistema Casa):

- lack of end users' technical culture: 25%
- inadequate know-how of installation firms: 35%
- lack of standards: 18%
- High cost: 20%
- Other reasons: 2%

In order to overcome these obstacles, more information activities are necessary (see also chapter 1.3.1). The inadequate know-how of installation firms can be overcome by means of training courses to prepare new working profiles: the “system integrator” and the “system manager” (see chapter 13.1.4).

The typical feature of the Italian industrial sector is the high number of small and medium enterprises. The SMEs are mainly located in Northern Italy, particularly in the North-East side: for AAL applications many initiatives are growing in Lombardia (the region of Milan), Emilia-Romagna (region of Bologna, Modena), Veneto, Marche.

The small dimensions of these industries implies advantages and disadvantages: the main advantage is the high flexibility and the capability of adapt very quickly the industrial activity to innovation. The main disadvantage is the impossibility of carrying out internal research activities because of the small dimension of the industry. In order to overcome this obstacle, in some areas the SMEs have created industrial districts, and they have undertaken co-operations with Universities and research centres. This solution has been adopted also for AAL applications in Milan and in Modena, where a new Laboratory has been created at the University and another at the Democenter. In these Laboratories researchers and industries work together to implement new AAL innovations and to transfer technologies.

1.6 Related industries that are involved

An in-depth study on existing AAL products and producers for elderly and disabled people was performed by Democenter (Modena), a research centre that created the "Laboratorio di Domotica" in Modena, together with many other enterprises.

The emerging market of home technologies is very wide and often the industries offer "luxury" products for a selected type of well-off user. On the contrary, the survey made by Democenter considers only products for elderly and disabled people, particularly for security, safety, autonomy, life quality improvement. The following Table 1.6.1 summarizes the results of the survey on the today's market of AAL Technologies.

<i>Aethra S.p.A. - Ancona</i>	Videotelephone for sensitive disabled people (deaf-and-dumb). It allows the use of deaf-and-dumb alphabet. It can be integrated with videocamera.
<i>Elettromeccanica Ancellotti - Mantova</i>	Automatic window opening and closing system.
<i>BTicino S.p.A. - Milano</i>	BTicino "MyHome System": Anti-blackout and energy saving system for household appliances; gas detection system; acoustic home control system; anti-intrusion system with tele-assistance and home video-control via internet (by using "MyHome Web" service).
<i>BVA System - Verona</i>	"Eye system" for remote control by means of a videocamera connected to a digital videorecorder. The videocamera can be operated through Internet Explorer by means of a remote computer. The recording can be activated by an alarm system.
<i>Chiavieri Rappresentanze - Carpi</i>	Home control system by means of the TV screen.
<i>World Datapark - Milano</i>	"EDS (En-Decoder System)" is used to make conventional electric system "intelligent". It can be controlled by a PC, by internet or by telephone.
<i>Domosat - Bologna</i>	Management of all electric equipments by a single keyboard. Automatic control of electric load (integrated control of household appliances for anti-black out and energy saving purposes).
<i>Duemmegi - Milano</i>	Automatic control of electric load (integrated control of household appliances for anti-black out and energy saving purposes). Home remote control.
<i>Hager Lume S.p.A. - Modena</i>	All lighting equipments and all motor loads can be controlled by a remote control switch.
<i>Home Automation System - Reggio Emilia</i>	An armband allows a continuous monitoring of physiological parameters like body temperature, frequency of movements, pulse, perspiration and gives an automatic alarm signal to a tele-assistance centre if the parameters go out of control.
<i>Helpicare by Didacare - S.Giovanni in Persiceto</i>	Many devices: automatic alarm system, telephone for blind people, remote control and voice control of household appliances, telephone that can be used without hands, and other devices.
<i>Hesa S.p.A. - Milano</i>	Alarm detector via radio and other types of alarm systems. Automatic control of household appliances.
<i>Merten Eurodime - Verona</i>	Remote home control via internet. Voice alarm system with gas detector.
<i>MOSS - Novara</i>	"Home Free", a system for remote control of Alzheimer patients, with alarm system.
<i>Open Automation Microsystems - RE</i>	Automatic window opening/closing system.
<i>SBS S.p.A. - Novara</i>	"Ambrogio" is a home remote control system via SMS.
<i>SINTHESI - Milano</i>	Remote control system for Alzheimer patients, with alarm system. Home remote control system by a switch or by a voice control system.
<i>Sistema Casa - Milano</i>	A complete system for helping people with mobility or sensitive disablement.
<i>Sistemi Integrati - Modena</i>	Automatic remote alarm system.
<i>Somfy Italia - Milano</i>	Automatic window opening/closing system.
<i>Spazio Italia (Gruppo Faac) - Brescia</i>	Remote control system for Alzheimer patients, with alarm system.
<i>Telesoccorso - Pavia</i>	Tele-care case with devices that can be directly used by the patient and transmitted to the telecare centre.
<i>Unirete Telecomunicazioni - Milano</i>	Automatic remote alarm system. Telephone that can be used without hands.
<i>Vimar S.p.A. - Vicenza</i>	Automatic gas detection and alarm system. Integrated home control system.

1.6.1 Pilot Projects and research/demonstration initiatives

Recently the construction of the first “automatic neighbourhood”, the residential area “Milano Certosa”, has been approved in Milan. It is the first great project (900 flats) where buildings are planned with an home automation system (the type produced by BTicino).

The Province of Trento recently signed an agreement with other institutions (ITEA Public Building Institute, ITC – Research Centre, and others) to allow the ITEA to construct buildings with AAL technologies (falling detection systems, voice control devices, ...).

The most important pilot projects and research/demonstration initiatives in Italy in the field of AAL technologies are:

Laboratorio di Domotica di Modena

This laboratory opened in 2001, was realized by ProMo (Society for the promotion of economy in Modena), together with Democenter, Centro Ricerche di Carpi, Enea, Quasco, ICIE, and other industries and associations.

This laboratory has a demonstration area (with solutions for elderly and disabled people), an exhibition area and an area for training courses (2000 hours of courses made so far). Sixteen enterprises present their technical solutions.

Laboratorio Imagelab

This laboratory is situated at the University of Modena and Reggio Emilia, Engineering Faculty. An important project called “Domotica per disabili” has been carried out here, financed by the Foundation Cassa di Risparmio di Modena (web site <http://imagelab.ing.unimo.it/domotica>, scientific papers in english can be downloaded).

The main results of the project are:

- the artificial visual system ProMaCoP (Probabilistic Maps Classifier of people Posture) for automatic control of elderly people at home and for detecting potentially dangerous behaviours (for example a fall) that can require a remote alarm.
- A disabled person who cannot use the hands to move the computer mouse can communicate through a laser pen (LaserHome) fixed on his head and pointed on a table.
- A disabled person who cannot use the hands to move the computer mouse can communicate through the movements of his face (FaceMouse) in front of a webcam.

Laboratorio di Domotica

created by the Foundation Politecnico di Milano (Technical University of Milan) and Merloni Elettrodomestici. An important project, called “Dis...abilità”, produced a special keyboard for disabled people, called Whisper, driven by breath modulation.

Domotics Lab

This laboratory was created at the ISTI CNR (Institute of Information Science and Technology), to carry out special projects on home technologies.

Intelligent building EDO (ENEA Casaccia - Roma)

It is a smart building/laboratory for research on AAL applications, situated in the ENEA research center near Rome.

TBM-Lab Bio-medical technologies Laboratory at the Technical University of Milan. Opened in 2003 to carry out research on e-health, human machine interface and other AAL technologies.

Scuola Superiore S. Anna (Pisa) promotes many projects on AAL technologies, funded by EU, Local Authorities and the Foundation Cassa di Risparmi di Livorno: "Auxilia", a test centre for robotic aids and software for motor and sensitive disabled people that live alone (a robot called MOVAID helps the disabled person in co-operation with a home automation system); "Equality" improves assistance by means information technologies (tele-rehabilitation therapies for patients with speaking disability).

Other application-oriented or commercial initiatives are:

C.E.T.A.D. - Centro Eccellenza Tecnologie per Anziani e Disabili (Center of excellence on technologies for elderly and disabled people) at the Environment Park in Turin. There is a smart home/laboratory, realized in co-operation with Don Carlo Gnocchi Foundation for technological aids and rehabilitation, Istituto Boella for information technologies, Politecnico di Torino (Technical University of Turin) for biomechanics and sensing.

Polo multifunzionale per la disabilita', (Multifunctional Centre for disability), opened in Bologna by the Regional Centre for Technical Aids (Centro Regionale Ausili) and Ausilioteca, for helping disabled people to find technical solutions to live better at home. Two smart homes (Casa Amica) will be realized in the Centre to find proper solutions for disabled people. The Centre co-operates with the Laboratorio di Domotica in Modena.

"Progetto Dimensione Casa Onlus - Casa più sicura", it is a project, with an operating centre in Bergamo, to promote home technologies with social purposes (activities are information, education, technology transfer, applied research).

Casa pre-dimissioni Ospedale E. Morelli - Sondalo (SO) (pre-discharge house of the Hospital Morelli in Sondalo). This pre-discharge house is a result of the European project FACILE (DE3207). The partners were: ICIE, Azienda Ospedaliera E. Morelli di Sondalo, Siemens Italia, Italdata, Politecnico di Milano.

Laboratorio di Domotica in Florence, it is not a research laboratory but a community of enterprises, institutions, associations, research centres and experts that promotes pilot projects on home and building automation.

Laboratorio ESLab, it is a smart building for research and innovation, opened in Reggio Emilia by the SMEs consortium Coimex United Companies, composed by many industries, like Smeg Spa, Immergas Spa, Sistema Casa, General Electric - Nuovo Pignone and many others.

"La casa intelligente", Faenza. It is a demonstrative smart home, with the most innovative available technologies, built by some industries like Aurora, Bticino, Cisa and many others (Celte, Galanti & Scaioli, Baggioni Arredamenti, Trony, Clipper, Mengozzi & Mazzoni, Alfa Termica, E.s.i. project).

Laboratorio "Casa Domotica", opened in October 2003 in Tuscany, in co-operation between Scuola Domotica and Eurosatellite. It is a demonstrative smart home/laboratory, available also for training courses.

1.8 User integration/usability tests

The most part of the projects mentioned in this report have been developed in co-operation with association of disabled people. ASPHI, AIAS, Don Gnocchi foundation, Ausilioteca are giving a very important contribution to define what a disabled person really needs.

Also the activity of the Province of Trento to build flats with AAL technologies (see chapter 1.6.1) was supported by a sociological research to verify the impact of these technologies on elderly people.

1.9 Identify blind spots for further research

The main challenges in this sector have already been indicated in chapter 1.6: the barriers and the corresponding solutions are shown in the following table.

<i>BARRIERS</i>	<i>SOLUTIONS</i>
Lack of end users' technical culture Wariness of users	Involvement of users and their associations (in Italy: Ausilioteca, AIAS, ASPHI, etc.) in the whole process, from research definition to system testing.
Inadequate know-how of installation firms	Training courses. New professional figures "System integrator" and "System manager" are needed.
Lack of standards	Standard updated at European level, also considering a "Design for all" approach.
High cost of the products	The market growth will produce a cost reduction. The State should pay for AAL technologies. A "design for all" approach should produce a scale effect and lower the costs for disabled people technical aids.

These barriers are typical of a small market and they will be easily overcome in a Europe-wide market structure. Therefore an European AAL169 programme can help create a future market with adequate technical culture on demand and supply side and low cost of technologies.

Moreover, there is a low number of research centres in Italy involved in AAL related topics, and an European programme can help reach a critical mass.

Research is necessary because current Home automation technologies are not properly integrated and many improvements are needed.

In this field the new "design for all" approach has to be employed: an AAL application must be designed for every kind of end user, disabled or not. This approach has two advantages:

- large scale applications can make innovative technologies available also for disabled people at low costs;
- research centres prefer to study innovative solutions with social purposes, for elderly or disabled people: but innovations for these categories are also available for everybody else.

2. National Programmes

2.1 National programmes already funding areas related to AAL

No relevant national programmes are currently funding AAL research projects at the moment. However, some research activities related to AAL can be individuated. For example, five research projects have been financed in EURIMUS, the Eureka Programme on Microsystems. The global funding is 6.428 million Euro and this amount comes from the Fund for industrial research FAR (see chapter 4.3.1).

Other important Programmes related to AAL are the FIRB Programme (FIRB = Fund for basic research, see chapter 4.3.1):

- Programma Strategico Nanotecnologie, Microtecnologie, Sviluppo integrato dei materiali (Strategic Programme on Nano-, Microtechnologies and integrated development of materials): funding 41.26 million Euro.
- Programma Strategico Tecnologie abilitanti per la Società della Conoscenza ICT (Strategic Programme on Enabling Technologies for the Society of Knowledge (ICT): funding 70.4 million Euro.

These programmes are funded by the Italian Ministry of Education and Research (MIUR). Full details on the funding structure can be found in chapter 4.

2.3 Major EC-funded projects with national organisation participation

There are 51 European projects with Italian participation that can be interesting for AAL within the IST Priority, with a global funding of 717.96 million Euro.

It is a great number of projects, and it is impossible to check all activities. However, it is interesting to mention only a few number of recent European projects (not only in the IST priority) that are related to AAL technologies:

- EUSAVE SMART-ACC (Acceleration of Smart Building Technologies and Market Penetration), project of the R&S Programme SAVE (Italian participants: ProMo, Enea).
- Project FACILE (DE3207). Participants: ICIE, Azienda Ospedaliera E. Morelli di Sondalo, Siemens, Italdata, Politecnico di Milano. Results: pre-discharge house of the Hospital Eugenio Morelli in Sondalo (SO).
- Project NJORD (participant: ICIE): evaluation of AAL systems for elderly and disabled people.
- The European Leonardo project “Domus novo” has been dedicated to the training in the field of home automation (started in 2002, Italian partner: Sinergie, other partners: Spain, Denmark, France). In all these countries the professional figure “Building Automation and System integrator”, with an intermediate knowledge between a technician and an engineer, is needed (internet site: www.domusnovo.com).
- Project POLIS (Decision Support Tools and Policy Initiatives in Support of a Universal Design of Buildings). Priority 8.1 Policy Oriented Research. 10 Partners, among them: ITC CNR.

3. Technological Progress: State of the Art

3.1 Technological fields/challenges

3.1.1 New Materials

The CNR targeted projects on “Special Materials for Advanced Technologies”, started in the '80s and completed in 2002, created a national community on new materials that includes public and private research centers, universities and industries. The second targeted project on “Special Materials for Advanced Technologies” had 57 coordinated research groups. Focusing our overview on the research centers interested in AAL applications, we mention: **University of Catania** (Materials and technologies for biosensing), **University of Rome “Tor Vergata”**, prof. Traversa, prof. Gusmano (ceramic materials, smart materials, gas sensors and actuators), **Consorzio Interuniversitario Sistemi a Grande Interfase**, prof. Baglioni (biosensors, molecular surfaces, bioactuators, biomolecular films), **Alenia Whitehead**, **Isoclima**, **Seima Italia**, **CRF - Centro Ricerche Fiat** (Fiat Research Centre), and others.

Among CNR institute:

IENI CNR (Institute for Energetics and Interphases)

The research fields of the Institute are: Inorganic materials and metals, materials and processes for energy systems, electrochemical materials and processes; Modeling, synthesis and chemical-physical characterization of new materials; Surfaces and interphases; Diagnostics.

IMEM CNR (Institute of materials for electronics and magnetism)

The research fields of the Institute are: Science of materials for electronic, optic, magnetic, and sensor applications; Semiconductors in massive form of films and dimensionally reduced systems; High-critical-temperature superconductors; Metal alloys and magnetic oxides; Surfaces.

ISMN CNR (Institute of Nanostructured Material Studies)

The research activities of the ISMN are focused on the development of Nanostructures and Nanotechnologies relevant in the fields of semiconductors for optoelectronics and photonics, environmental catalysis, surfaces functionalisation, biomolecules for biosensors and bioelectronic devices.

Currently the section of the ISMN-CNR in Bologna is involved in a very important EU-funded Project called **NAIMO**. It deals with the matching of organic nanoelectronics with solution-based additive manufacturing techniques such as printing to transform plastic film substrates into smart multifunctional composites.

Other important research activities at the ISMN CNR concern Organic Leds, to be used for lighting and interfaces (PC Screen, etc...).

3.1.2 Microelectronics and Microsystems Technology

The sector of microelectronics and microsystems technology also took advantage of the CNR targeted projects on “Special Materials for Advanced Technologies”, that funded industries and research centres in this field. Relevant centres are **Optel InP**, **Scuola**

Superiore S. Anna (Microsystems for microactuators), **University of Catania** and the following industries and institutes:

STMicroelectronics, one of the world's three largest independent semiconductor suppliers, develops semiconductor solutions across the spectrum of microelectronics applications. In Italy ST has research centres in Agrate (actuators, sensor arrays) and Catania (biosensors).

ITC-IRST (Trento)

The Microsystems Division (MIS) of ITC-IRST, established in 1991, is a national reference centre for research and development of silicon integrated microsensors and related technologies. Basic research is carried out in co-operation with Universities and Research Centres, while applied research, aimed at the development of prototype devices and complete microsystems of commercial interest, is carried out in co-operation with Industries, usually SMEs.

The availability of a microfabrication facility as well as the related design and testing capabilities allow the in-house development of a variety of micron-size devices ranging from silicon integrated microsensors to custom designed ASIC-CMOS. A special effort has been recently devoted to the development of MEMS (Micro Electro Mechanical Systems) and to the related surface/bulk silicon micromachining technologies to complement the more conventional CMOS. Emphasis of IRST-MIS research is on optical, biochemical and micromechanical sensors with on chip CMOS interfaces and pre-processing circuitry, on X-ray and high-energy particle detectors, on special devices for advanced scientific research.

IMM CNR (Institute for microelectronics and Microsystems)

The IMM CNR (Catania) is a scientific structure covering strongly competitive fields such as microelectronics, sensors, and microsystems. IMM CNR managed many European projects (ENDEASD, FRENDECH, ADAMANT, SINERGIA), some national projects (FISR) and co-operates with ST Microelectronics.

IFAC CNR (Institute of applied physics)

The research fields of the Institute are: Methodologies and applications of electromagnetic waves, optics, quantum electronics, and interactions between radiation and matter; Structure of matter; Applied spectroscopy; Optoelectronics and photonics; Laser and applications; Electromagnetism; Optical Sensors and observation methodologies; Information processing.

3.1.3 Energy generation and control technologies

Many research companies and industries are involved in research activities on energy generation, particularly for new propulsion systems and stationary energy generation units. Some big industries are involved, like **ENI** (National Hydrocarbon Company) and **ENEL** (National Electric Energy Company, with its research centre **CESI**), **FIAT** (with the **CRF**, Fiat research Centre) and the public research company **ENEA** (National Company for Energy and Environment).

Other relevant R&S Centres in the energy sector are: **Nuvera Fuel Cells**, **Pirelli Labs**, **Ansaldo Ricerche**, **ITAE CNR** (Institute for advanced energy technologies).

The **ST Microelectronics** (Catania) is working on micro fuel cells for portable electronic applications, together with other institutes (**IMM CNR**, **ITAE CNR**, **ITS CNR** and **Pirelli labs**). This activity is partially supported by a National Research Project. In the project, ST leads and coordinates the activity related to micro-fuel cell fabrication and integration.

A national programme on Fuel Cells is co-ordinated by ENEA, with ITAE CNR, Fiat Research Centre, Nuvera Fuel Cells.

Interesting research activities on batteries are carried out by ENEA, CESI, Edison and some university institutes (For example the University of Rome).

3.1.4 Human Machine interfaces

The problem of human-machine interface is very important for heavy disabled people, and many research centres deal with this problem. Many projects are performed by Laboratories for AAL applications (“Laboratori di Domotica”, see chapter 3.2.4) and by Research centres on Robotics (see chapter 3.2.6). For example, the **Imagelab Laboratory** of the University of Modena carried out a project called “Domotica per disabili”. Two important devices, called LaserHome and FaceMouse, were developed to help a disabled person who cannot use the hands to interact with a computer.

Other relevant laboratories are:

Laboratory WoWS!Lab (Wearable embedded Or Intergrated Wireless Sensor! Lab), inside the TBMLab Laboratorio di Tecnologie Biomediche - Politecnico di Milano. The research activity of WoWS!Lab concerns:

- advanced technologies for the human-machine interface, developing systems and methodologies for multi-input Brain Computer Interfaces (BCI);
- development and application of Wearable sensors and related methodologies for the non intrusive measurement of the biological signals during the spontaneous behaviour of the person.

Co-operation activities with: ST-Microelectronics, Laboratorio di Domotica della Fondazione Politecnico di Milano e Gruppo Merloni.

Laboratorio di Domotica of the Politecnico di Milano Foundation and Merloni Elettrodomestici. An important project, called “Dis...abilità”, produced a special breath-driven keyboard for disabled people, called Whisper, able to transform breath or voice into letters.

ICAR CNR (Institute for high performance computing and networking)

The laboratory of robotics at the ICAR CNR performed a project on a human-machine interface based on a robotic hand (DIST-Hand) and a low-cost video acquisition system.

3.1.5 Communication

Telecom Italia Lab is the research company of Telecom Italia. Telecom Italia Lab develops mid-to-long term research, also in synergy with **Pirelli Labs**, and short-term research, centered on the market of the Telecom Italia Group. Research for network, service and terminal innovation, supported by scouting activities as well as by laboratory and testing activities, and research aimed at designing and prototyping network services and systems. The main research areas are:

- Technological and architectural evolution of fixed and mobile core networks
- Ubiquitous seamless access
- Broadband and mobile, localization and security, internet and multimedia services
- Networks and services management: decision making support and technologies of expert system and learning

Another important industries are: **Urmet** (Turin), **Siemens Italia** (that co-operated in many smart home projects in Italy). Among CNR institutes:

IEIT CNR (Institute of Electronics, Computer and Telecommunication Engineering)

Research fields: processing and synthesis of signals and images, and shape recognition, telecommunication networks and systems, and wide band multimedia services, nano- and micro-electronic technologies and systems.

IIT CNR (Institute for informatics and telematics)

Research fields: Information and communication technologies : Data transfer networks and internetworking techniques; Network security and information protection; Certified electronic transactions; Telematic applications. Computational sciences: Algorithms and computational complexity Parallel and distributed computing; Criptography and security; Computational biology; Algorithms for WEB technologies.

IFAC CNR (Institute of applied physics)

IFAC managed the European project AVANTI for the development of adaptive and adaptable interactions methods for accessible multimedia telecommunications applications. The main objective of AVANTI project is to demonstrate that it is possible to develop generic multimedia telecommunications applications, which are adaptable and adaptive to the requirements of most potential users including disabled people, elderly people and other users.

3.1.6 Software, web & network technologies

Among the great number of institutes and research centers involved in this sector, we mention the following ones:

IBM Italia Foundation, in co-operation with ASPHI Foundation, promotes the use of information technologies for the professional integration of disabled people, through the projects: Kidsmart, Web Adaptation Technology (Wat) and “Guidelines for the integration of disabled people in the industries”.

ICAR CNR (Institute for high performance computing and networking)

Research fields: High performance computing systems. Parallel computing. Environments, protocols, and advanced technologies for computer networks and internet. Intelligent and complex functionality computer systems.

ISTI CNR (Institute of Information Science and Technology)

The research fields of the Institute are: Formal Methods and Tools, Software Engineering, System and Software Evaluation High Performance Computing, Dependable Computing, Wireless Networks, Networked Multimedia Information Systems, Information Systems, Knowledge Discovery and Delivery, Human Interfaces in Information Systems, Creative Virtual System, Home Automation and Computer Aids for Disabled and Elderly Persons, Visual Computing, Signals and Images, Mechanics of Materials and Structures, Space Flight Dynamics.

IMATI CNR (Institute for applied mathematics and information technologies)

The research fields of the Institute are: Mathematical informatics; Differential modeling and numerical analysis; Mathematical statistics.

3.2 Potential fields of application and societal demand

3.2.1 Gerontotechnics

Many devices for helping elderly people at home in everyday life are already produced (see chapter 1.6). Innovative solutions are being studied by research centres and many solutions for disabled people can be useful for elderly people as well.

An example of innovative system for elderly people is the artificial visual system ProMaCoP (Probabilistic Maps Classifier of people Posture), developed at the **Imagelab Laboratory at the University of Modena**, for automatic control of elderly people at home and for recognizing potentially dangerous behaviours (for example a fall) that can require a remote alarm.

A similar fall detection system has been developed by the **Istituto Trentino di Cultura (ITC)** in Trento.

3.2.2 Health care/Wellness

Some tele-care systems for monitoring health conditions are already available, but many innovations are possible in this field. An important research centre for health care technologies is the **TBMLab - Laboratorio di Tecnologie Biomediche** at the Politecnico di Milano (Laboratory of Biomedical technologies at the Technical University of Milan). Research activities concern telecare and tele-rehabilitation systems; analysis of movement, breathing, position; technological innovation in surgery and radiotherapy; ergonomics; man-machine interface; ambient intelligence.

A project of the **Scuola Superiore S. Anna (Pisa)** called "Equality" improves assistance by means information technologies (tele-rehabilitation therapies for patients with speaking disability).

3.2.3 Services

The **Domotics Lab** of the ISTI CNR (Institute of Information Science and Technologies) deals with the following topics: interoperability between different systems and hardware and software components; energy management, home automation, homecare, distance learning, home office, e-entertainment and multiplayer gaming.

Current Projects of ISTI CNR are:

- HATS - Home Automation Technologies and Standards (partners: ISTI CNR, ThinkWare Corporation, Microsoft Italia): development of an architecture for ambient intelligence which allows interoperability and integration amongst diverse devices into a coherent environment. The goal is the definition of a markup language, to standardize the rules for information interchange, DomoML, and a middleware, DomoNet, to facilitate a home distribute computing.
- NICHE - Natural Integration in Computerized Home Environment (partners: ISTI CNR, Dynamics of Language Group (DYLAN) ILC CNR, WebW3C Lab ISTI CNR): future technologies will provide users with the direct control of several devices surrounding us in a common home environment; nevertheless, this could end up adding complexity rather than reducing it, if no support for high-level interfacing is introduced. Thus the idea of this project, that aims to realize a natural user-home interaction according to the Ambient Intelligence vision.

Inside Domotics lab staff, a group called GAID - Gruppo Ausili Informatici per disabili (Group on Information aids for disabled people) is studying computer based aids for disabled and elderly people. Among European projects with ISTI partnership, we can mention: Defie, Domoh, Mosaic-HS, etc. and among National projects: Sfera (Autonomy recovery system).

3.2.4 Smart home

The Laboratories on AAL applications, already described in chapter 1.6.1, are devoted to develop innovative solution for smart homes:

- **Laboratorio di Domotica** di Modena (ProMo, Democenter, Centro Ricerche di Carpi, Enea, Quasco, ICIE, and others).
- **Laboratorio Imagelab** at the University of Modena and Reggio Emilia.
- **Laboratorio di Domotica** (Politecnico di Milano Foundation and Merloni Elettrodomestici).
- **Domotics Lab** at the ISTI CNR (Pisa).
- **Intelligent building EDO** (ENEA Casaccia - Roma).

Other relevant research centres on AAL are: **TBM-Lab** Bio-medical technologies Laboratory at the Technical University of Milan, **Scuola Superiore S. Anna** (Pisa), and **ITC CNR** (Institute on Construction Technologies).

The ITC CNR is involved in construction technologies for hospitals, nursing homes and houses for elderly people and people with disabilities, included various building solutions with different levels of services and care facilities, and new home automation and communication technologies providing support for a safer and more comfortable life. In a broader perspective, the Institute is involved in the topic of the Universal Design of a built environment for the largest number of user groups, regardless of age, abilities and physical/sensorial limitations.

3.2.5 Smart textiles

Textile industry is very important in Italy, particularly in some districts (for example in the area of Prato, near Florence).

A new company, called **Smartex** (Prato, Tuscany), was created in 1999 to introduce innovation and hi-tech in the Italian textile district, through integration of the traditional know-how in textile manufacture with the innovations required by the highly competitive context. Smartex is funded by several leading manufacturing textile industries. Several research projects are carried out along with the Centro Interdipartimentale "Enrico Piaggio" of the University of Pisa, in the laboratory hosted in the "Polo Scientifico e Tecnologico" of Navacchio (Pisa). Smartex is working on projects related to wearable electronics garments in the field of health-care, sport, automotive, virtual reality, rehabilitation and motion control. Smartex' laboratories are located in the "Polo Tecnologico" of Navacchio (Pisa).

The main projects are:

- **MEGA** (Smartex took part to the Multisensory Expressive Gesture Applications project, IST-1999-20410, funded by EU and now closed).
- **ARIANNE** (Feasibility study of yarns and fabrics with annexed electronic functions (IST-2001-39262, EU funded project).

- WEALTHY Wearable Health Care System (IST-2001-37778, EU funded project). Wealthy is an intelligent T-shirt for ECG analysis.
- FIRB Programme “Development of technologies for implementation of electronic components and devices on textile substrates” (funded by the Italian Ministry of Education, University and Research).

Other important research centres on smart textiles are: the R&D department of **SAATI GROUP** (a multinational textile-chemical group), **ICTP CNR** (Institute of Chemistry and Technology of Polymers) located in Pozzuoli (Naples) and **ISMAL CNR** (Institute for macromolecular studies) in Milan.

3.2.6 Robotics

Many laboratories on robotics, particularly in Universities, deal with technologies for elderly and disabled people. A project of the **Scuola Superiore S. Anna (Pisa)** called “Auxilia”, set up a test centre for robotic aids and software for motor and sensitive disabled people that live by themselves (a robot called MOVAID helps the disabled person in co-operation with a home automation system). Other centres on robotics for AAL applications are:

Laboratory of Robotics (Dept. of Mechanics) at the Technical University of Milan (Politecnico di Milano) has been developing research projects on robotics and systems' mechanics. These include: "Gilberto", a voice-controlled robot, a robotic mechanical hand, a mechatronic leg prosthesis, telerobotics for surgery application, medical and surgical robotics as well computer aided simulations for neuro-motor rehabilitation.

LARDEIS (Laboratory of Automation and Robotics at the University of Bologna)

A relevant project was VIDET (VIsual DEcoder by Touch), a device converting visual information into tactile information for visually impaired users.

ISIB CNR (Institute of Biomedical Engineering)

The research fields of the Institute are: Modelling and simulation of biological systems, and processing of data, signals and images relevant to biomedicine and environment; development of methodologies and biomedical devices for diagnosis, rehabilitation and health care. Computer science and its applications to autonomous systems and robotics, conceptual modelling, and biomedicine and health.

ISTC CNR (Institute of cognitive sciences and technologies)

The research fields of the Institute are: Cognitive, communicative, and linguistic processes, Artificial intelligence, Knowledge technologies, neural networks, autonomous robotics, etc.

A relevant projects is the national strategic project “RoboCare”, sponsored by the Italian Ministry for Education and Research (partners: ISTC-CNR, ISTI-CNR, ICAR-CNR, ISSIA-CNR, University of Genova, University of Turin, "La Sapienza" University of Rome). The goal of RoboCare project is to build a multi-agent system which generates user services for human assistance.

3.2.8 Sociology

Many studies have been made in Italy on social acceptance of AAL Technologies. A leading role in this field has been played by some Associations involved in supporting elderly and disabled people: **Ausilioteca** in Bologna, **AIAS**, **ASPHI Foundation**, **Don Gnocchi Foundation**. The most important contribution of these Association is the involvement of disabled people in choosing the most proper technical aids.

Other scientific institutes are: **IRP CNR** (Research Institute on Population), **ISTC CNR** (Institute of cognitive sciences and technologies), **Scuola Superiore S. Anna** (PISA), **Consorzio Pisa Ricerche**, **CETAD** (Excellence Centre on technologies for elderly and disabled people) and **ISMB** (Institute Mario Boella).

CETAD carried out some interesting research projects:

- **EXPERTISE** project (EXchange and Promotion of tElematic and Robotic Technologies for vocational training and employment of the dISabled) for professional skill improvement of disabled people.
- **TARGET** project (in collaboration with INAIL, Politecnico of Torino and ASPHI Onlus) also for promoting professional skill improvement of disabled people.
- **ADITech** project (in collaboration with ISMB and Regional government of Piemonte) regarding an innovative telemonitoring system.

An interesting project, called **DOMUS**, carried out by AIAS and Ausilioteca, individuated the economic and cultural barriers to the diffusion of AAL technologies within disabled people.

3.3 Re-use, sustainability

At the moment no research centres on AAL technologies deal with the problems of re-use, recycling and other environmental issues.

3.4 Standards

Many experts say that the lack of a proper standardization in the sector of home and building automation is a barrier for the growth of this market. The interoperability of the systems and the products is absolutely necessary for the consumers.

New needs, new products and new jobs require a continuous updating of the standards. The CEN/CENELEC guide recommends to involve elderly and disabled people in the revision of the standards and many experts think that ICT standards should follow the principles of "design for all".

4. Structure of National Public Funding

4.1. What is needed for the implementation of a national AAL program in your country?

The implementation of a national AAL programme in Italy requires a positive political decision of the Ministry of Education and Research (MIUR) as well as the allocation of a corresponding budget for the whole duration of the programme. The MIUR supports the implementation process and funds the programme after its approval.

In this frame some remarks are necessary:

- 1) A national AAL programme must be compatible with the National Research Plan (PNR). The procedure for PNR approval is described in chapter 4.2.3. The research subjects that are relevant for the AAL programme (microsystems, information and communication technologies, enabling sciences,...) are unanimously considered of strategic importance for the Italian economy and society. R & D activities in these fields have been financed over the last years (see also chapter 4.8). The above-mentioned research subjects will surely be considered strategic also in the next PNR, shortly to be issued. However, nobody can tell if the funds for Microsystems and other AAL-related topics will be allocated in a transdisciplinary AAL programme or in other specific programmes. Until now these topics have been funded separately. A lobbying activity is therefore necessary to direct such funds towards the AAL programme instead of other national programmes.
- 2) The current Italian legislative period will end in May 2006. Bearing in mind that the implementation of a new research programme belongs to the MIUR and to other political actors (Ministry of Economy, Parliament), the decision strongly depends on the political trends of the next legislative period starting in 2006.

4.2. Actors

4.2.1. Decision makers

R & D programmes can be prepared and funded by the MIUR, Regional Governments or Public Research Companies, like the National Research Council (CNR).

At the moment the MIUR is the main funding agency for the most important national research programmes in Italy. The funding procedures of the MIUR are in-depth described in chapter 4.3.

4.2.2. Sponsors

The MIUR (and other funding agencies like CNR) uses a budget set by the Ministry of Economy and the Parliament, through the annual budgetary law (see chapter 4.2.3). The FISIR Projects (see chapter 4.3) are funded by the Ministry of Economy.

4.2.3. Owners/Hosts

The MIUR decides the research Programmes worth funding through its Scientific Committee. Moreover, the MIUR prepares the National Research Plan (PNR) that outlines the strategic research fields to be financed in the short run.

The procedure for PNR approval is described as follows. Every year the Minister of Economy presents the Document of Economic and Financial Planning (DPEF). This document must be approved by 30th June and outlines the mid-term economic policy in the following 4 years (the current DPEF covering the period 2005-2008). The DPEF also states the financial measures of the budgetary law for the following year to be approved by 31st December.

In the DPEF the Ministry of Economy indicates the strategic priorities for public funding support in favour of scientific and technological research and fixes the budget.

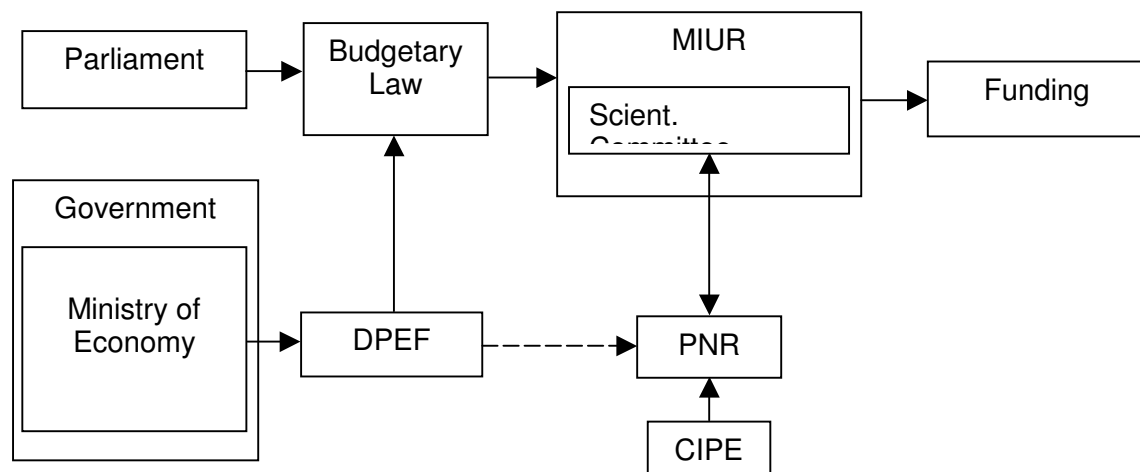
According to the DPEF resolutions, every 3 years the MIUR prepares the PNR, that defines the goals and the main research topics to be funded in Italy in the short-term. The PNR needs the approval of the Interdepartmental Committee for Economic Planning (CIPE). The PNR is also updated on a regular yearly basis by MIUR and re-approved by CIPE.

Every year the Parliament approves the budgetary law and decides the fund allocation for the research topics indicated in the PNR.

Therefore, the MIUR is not the only actor in the implementation of a new national research programme, because:

- the PNR must go along with the DPEF resolutions, depending on the policy of the Ministry of Economy, and it is subject to CIPE's approval;
- the available budget is then decided by the Parliament through the annual budgetary law, that puts into action the PNR guidelines.

The following figure shows the procedure as described in this chapter.



4.3. Structures

4.3.1. Format of funding (programmes, projects)

The current trend for funding allocation is the following. Up to a few years ago, the CNR has been a very important funding agency for basic and applied research, organising and funding many Targeted and Strategic Projects in every scientific field. Nowadays, the main national research programmes are managed and funded directly by the MIUR.

The MIUR is the top agency for both national and European funds. The Ministry favours the top-down procedure and issues Call for proposals on specific subjects within the priorities indicated in the PNR.

The most important Funds of the MIUR are:

- **Fund for Industrial Research (FAR).** The Ministry has an annual budget and allocates the funds to Industrial Research Centres (that can also co-operate with

Public Research Centres or Universities). The percentage of public funding is higher for companies placed in depressed areas. The funding procedure can be:

- a) bottom-up procedure. A Company proposes a research project. The scientific value of the research and the economic reliability of the company are assessed by experts designated by the Scientific Committee of the MIUR (composed by 10 members and a President). According to the experts' reports, the Scientific Committee decides whether to fund the project or not.
 - b) top-down procedure: The MIUR, according to PNR guidelines, individuates priority subjects, a corresponding budget and issues a Call for proposal. The evaluation process is the same of the bottom-up procedure.
 - c) automatic funding (for example, for recruitment of researchers).
- **Fund for basic research (FIRB)**. The MIUR has an annual budget and divides the funds between different research topics as indicated in the PNR, to finance Universities and other Research Centres (that can also co-operate with private companies, but the latter cannot be funded by MIUR and must transfer patent royalties – if any – to Universities and public Research Centres). The percentage of public funding is 70% of the total expenses. The funding procedure can be:
- d) bottom-up procedure. The public Research Centre proposes a research project. The scientific value of the proposal is assessed by an expert. According to the expert's report, the Scientific Committee of the MIUR decides if the project is worth funding.
 - e) top-down procedure: The MIUR, according to PNR guidelines and the decision of the Scientific Committee, can propose strategic Programmes on specific subjects or Special Projects to improve research infrastructures. After the CIPE's approval, the MIUR comes to an agreement with Universities or Public Research Companies (like CNR) to carry out these Projects. The evaluation process follows the same pattern of the bottom-up procedure.
- **Integrative Fund for strategic research (FISR)**. Specific research Projects of strategic importance indicated in the PNR can also be funded through another source called FISR. Universities and other Research Centres can receive funds and private companies can co-operate, but they cannot be funded by MIUR and must transfer patent royalties (if any) to Universities or public Research Centres. The percentage of public funding is 70% of the total costs and for a three-year term. The evaluation procedure is carried out by a Committee whose members are appointed by the MIUR, the Ministry of Economy and other Ministries (depending on the specific research project). The projects are assessed by experts, then the Committee approves them and the Ministry of Economy funds the research activities. For example, some recent FISR Programmes are:
- Food quality (24.2 MEuro)
 - Sustainable development and climate changes (26.8 MEuro)
 - New production processes and energy management (89.8 MEuro)

CNR Programmes

Up to a while ago the CNR Targeted Projects have been the first and foremost means of funding applied research. For example, over the last 20 years some important Targeted Projects concerned Energy Conversion, Transportation, Advanced Materials and many others. Some of them are still in progress. The CNR could also put other Projects into action,

though, as a matter of fact, the current political trend indicates the MIUR as the top public funding agency in Italy.

The Targeted Project lasts 5 years and the global funding must be approved by the CIPE. A Targeted Project is divided in many sub-projects and each of them involves some research activities. To set an example, the framework of the Targeted Project on Special Materials for Advanced Technologies (MSTA) is here described. The MSTA sub-projects were:

Sub-project 1: Ceramic and metallic materials, related composites, surface coatings and treatments

Sub-project 2: Product and process innovation in traditional materials

Sub-project 3: Polymeric materials and related composites

Sub-project 4: Surfaces and molecular materials

Sub-project 5: Materials and processes for electronic, optical and electromechanical applications

Sub-project 6: Biomaterials

The budget of the MSTA Project has been about 30 Million Euro in the period 1998-2001. The Project funded 57 coordinated research networks. The 24.8% of funding was given to CNR research Institutes, the 44.5% to Universities and the 30.7% to private companies (that self-financed the 50% of the total research cost). Research activities on Microsystems were included in the sub-project 5, and they received a global funding of about 3 Million Euro.

Among the different types of programmes described in this chapter, the most suitable for AAL could be the framework of a CNR Targeted Project. However, in all likelihood a specific procedure will be directly arranged by the MIUR for the implementation of a national AAL programme.

4.4. Legislation Processes, balance of power

In Italy a new funding programme is linked to a budgetary law subject to Parliament's approval at the end of each year. For example, the 2005 budgetary law must be approved by 31st December 2004. The budget for a new research programme is part of the global budget that the budgetary law allocates to the MIUR.

4.4. Federal, central regional considerations and requirements

The approval of a national research programme follows the pattern described in 4.1, 4.2, 4.4. No other specific federal or regional authorities are to be considered for passing a new research programme. Since 2001 the autonomy of Regional Governments has greatly increased and research programmes can be funded by the Regions themselves. Nevertheless, regional funds cannot be considered for the AAL programme, because they are mainly addressed to local projects.

4.6. What is the benefit of going European?

No doubt a co-ordinated EU programme can positively affect all members in different ways. Some benefits can be pointed out:

- 1- Synergies can save duplication in similar research activities carried out in different countries. The knowledge of researchers can be broaden and improved through the creation of a scientific AAL community in Europe.
- 2- A transnational AAL programme can induce innovation in small and medium enterprises and their entry in the European market. Costs can be reduced through a better cross-linking of national initiatives (future AAL products cannot be expensive to be accepted by the market). A European programme can help finding a selected stock of products and applications among the possible ones, the most interested users and the supporting institutions (hospitals, local governments) that will pay for these new technologies. Another advantage of AAL is the very wide range of products that can offer new marketing opportunities to many different types of companies.
- 3- Concerning the art. 169 initiative on AAL, European approach and the prospects of a transnational AAL programme can improve awareness among decision makers about the importance of the programme.

4.7. Time frame for national budgetary planning processes

Considering the procedures described in chapters 4.1 ÷ 4.4, or another similar procedure needed for the implementation of a national AAL programme, the planning process requires about one year to be completed.

4.8. Estimated share of national budgets likely to be agreed upon

Our estimation of a possible funding of a national AAL programme can be calculated on the funds allocated by MIUR and CNR to research activities on Microsystems over the last years. In the period 1998-2001 the MSTA Project of CNR allocated 30 million Euro for research on new materials. In this budget about 3 million Euro were assigned to microsystem research. The MIUR has funded, through the FIRB 2001, the Strategic Programme on Nano-, Microtechnologies and Integrated Development of Materials with about 40 million Euro in the period 2002-2004. In this budget about 20 million Euro were assigned to Microsystems. In addition to this, the MIUR has allocated 7 million Euro in the period 2000-2002 for other projects on Microsystems.

Therefore, in Italy the public funding for R & D Projects on Microsystems have reached the total of about 30 million Euro over the last six years. The average budget has therefore topped about 5 million Euro/year (even if each project falls under a different financial time frame). Therefore, expectations for about 3 million Euro/year for 5 years assigned to a national AAL programme are likely, as long as the initiative will be approved.

4.9. Requirement of formal and informal lobbying

As already mentioned in chapter 4.1, a lobbying activity is necessary to direct the fund allocation towards the AAL programme instead of other national programmes. A transdisciplinary application oriented AAL programme could be greatly appreciated in this moment in Italy, particularly by private enterprises, because the low economic growth requires an increase of the innovation potential. Therefore, a lobbying role could be played by private companies and by associations that represent them (like the Confederation of

industrial enterprises – Confindustria – and the Italian Association of Industrial Research – AIRI). Obviously, in order to achieve a successful AAL implementation, the decision makers (the main representatives of MIUR and CNR) must be contacted and involved in the process. A dissemination activity in the society can also be useful to create awareness of the social benefits of an AAL programme (associations of users, local governments, Ministry of Health, medical associations, ...).

6. Sources and Links

6.1 Books, articles brochures

- "L'Italia dell'e-family" (E-family in Italy), Report FEDERCOMIN-ANIE, February 2004.
- "Il quadro della vita degli anziani in Italia" (Life conditions of elderly people in Italy), Survey Censis-Salute La Repubblica, March 2004.
- "Gli edifici intelligenti: opportunità per le imprese e per gli utilizzatori" (Smart buildings: opportunità for industries and users), CNA Firenze and Firenze Tecnologia, December 2003.
- "Tecnologie Amiche per anziani e disabili" (Smart technologies for elderly and disabled people), University of Modena and Reggio Emilia and Democenter, December 2003.
- Libro Bianco su "Tecnologie per la disabilità: una società senza esclusi", (White book on technologies for disabled people), Ministry of Innovation, March 2003.
- "Studio generazionale sui media", (Generation survey on media), Ministry of Innovation, September 2004.
- BRIDGE "Ausili tecnologici contro l'esclusione sociale" (Assistive technology against social exclusion), Bridge Project Report 2002.
- "Le condizioni di salute della popolazione, rapporto 2001" (Survey on health conditions of the population), ISTAT National Institute of Statistics.
- D. Triscuoglio, "Introduzione alla domotica", (Introduction to home technologies), Tecniche Nuove Ed. - 2004
- G. Quaranta, P. Mongiovì, "L'abc della domotica" (ABC of home technologies), Editore Il Sole 24 Ore Pirola - 2004
- M. Capolla, "Progettare la domotica. Criteri e tecniche per la progettazione della casa intelligente", (Criteria and technologies for smart home planning), Maggioli Editore - 2004
- S. Bellintani, "Manuale della domotica. Tecnologie ed evoluzione dell'abitare", (Handbook of home technologies), Editore Il Sole 24 Ore Pirola - 2004
- P. Molinari, "Year-book 2001-02. Design per la casa intelligente", (Design for a smart home), Editore CUSL – 2002
- Expoenergy 2002 Proceedings, available on: www.promonline.it/attiexpoenergy.html.
- Conference proceedings of the "settimana della domotica 2002", also in: www.promonline.it/settimanadomotica02.html
- Report of the EU Project "BRIDGE - Assistive technology against social exclusion", 2002.
- "Edilizia e tecnologie di automazione per l'abitare degli anziani" (Building and home technologies for elderly people, supplement to the magazine De Qualitate, n. 11, December 2000.
- "Requisiti per le abitazioni degli anziani" (Requirement of houses for elderly people), casa editrice DEI, Roma, 1998.
- "Tecnologie informatiche e residenze per anziani" (Information technologies and housing for aged people), report of the Workshop between ITC-CNR and the Japanese BRI-MoC (Building Research Institute, Ministry of Construction) on smart homes for elderly people, publication ICITE 1994.

6.2 Internet sites

Some internet sites on technology aids for elderly and disabled people:

www.domotica.it: portal on Home Automation and related technologies, also for disabled people.

www.domotica.ch: portal of the Italian speaking Swiss, on Home Automation and related technologies, also for disabled people.

www.labdom.it: portal on home and building automation of Firenze Tecnologia and CNA..

<http://siva.welfare.gov.it/ITA> (or www.siva.it): SIVA portal (Assistite Technology Research and Information Centre) on technologies for disabled people.

www.disabili.it: portal for disabled people.

www.asphi.it/english/HomePage.htm: site of the ASPHI Foundation, on promotion and development of projects to reduce handicap by means of information technologies.

www.affarisocialihandicap.it/tematiche/tecnologie.asp: portal of the Ministry of Social Affaire on technologies for disabled people.

www.aidalabs.com: site of the association AIDA (Aids and information technologies for disabled and elderly people).

www.superabile.it, portal INAIL on disability.

www.ausilioteca.org: The AUSILIOTECA is a public service providing consulting activities regarding technical aids for disabled people.

www.disabilitaincifre.it: statistical data on disability in Italy.

<http://www.ambientediritto.it/Legislazione/Disabili/Disabili.htm>: portal on legislation for disabled people.

www.handylex.org: portal on legislation for disabled people.

www.webaccessibile.org: site on web accessibility.

<http://www.handimatica.it>, site of the exhibition Handimatica.

<http://www.ability-techhelp.it>, site of the exhibitions Ability and Technhelp.

<http://www.centriausili.it>, site of the working group Centri Ausili Elettronici e Informatici per Disabili (Centres on electronic and computer aids for disabled people).

<http://www.areato.org>, Site of the association AREA in Turin.

www.progettodimensionecasa.it, site of the association Casa Sicura Onlus.

www.cavazza.it/cavazza2000/catalogo.html: site on technical aids for blind.

www.piergiorgio.org/ufficih/mpa: site on technical aids.

Research laboratories:

www.laboratoriodomotica.it

(also: www.democenter.it/laboratori/domotica and www.promonline.it/laboratoriodomotica.html)

<http://imabelab.ing.unimo.it/Domotica>

<http://andi.casaccia.enea.it/andi/casa.htm>

www.cbi.polimi.it/index.html

www.isti.cnr.it/ResearchUnits/Labs/dom-lab

Training courses:

www.democenter.it/laboratori/domotica/formazione.asp

www.scuoladomotica.it

www.sistemacasa.it

Other interesting portals:

www.edilportale.com

www.edilio.it

www.safetal.com

www.waycasa.net/root/elettronica.html

<http://www.lacasaautomatica.it>

www.casacomoda.it

www.elettronet.it

www.homeautomationindex.com

www.home-automation.org

www.sicurweb.it

Institutions and industries:

www.anciss.it

www.federaeit.it

<http://www.cedia.it>

www.itc.it/indexe.aspx

www.promonline.it
<http://www.democenter.it>
www.sistemacasa.it
<http://www.bticino.it> (or: www.myhome-bticino.it/ft)
www.icie.it
www.auxilia.it
<http://www.domustech.it>
<http://www.hbgroup.it>
<http://www.innovatec.it>
<http://www.italdata.it/casa.htm>