

Corte Roncati: an example of innovation in AT service delivery and inclusive building for elderly and people with disabilities

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Abstract—Since 2007 three highly specialised centres in the field of assistive technology, home adaptation and domotics, have been working in Bologna under the same roof in a new centre called Corte Roncati. The driving idea that lies behind this new way of working is to integrate various perspectives on the problems of the elderly and the disabled in a service flow that aims at fostering autonomy, inclusion and participation. The Corte Roncati centre is also fully integrated into a comprehensive programme called “Casa Amica” (Friendly Home) that has been developed and implemented by the Emilia Romagna region to ensure that elderly citizens and citizens with disabilities have access to information and advice concerning home environment accessibility and liveability.

The second part of this paper will describe the guidelines – drawn up in order to meet high service delivery standards in an appropriate environment - that have inspired the design of Corte Roncati. We focus on two smart apartments: one catering for the needs of people with severe disabilities, the other targeting the needs of the elderly.

The final part of the paper consists in a discussion of the results the team has achieved so far and the lessons that have been learnt in the process of becoming the main AT resource centre in Emilia Romagna.

I. INTRODUCTION: A NETWORK OF RESOURCE CENTRES DEDICATED TO AMBIENT DESIGN AND ADAPTATION

Since 2001, the regional government of Emilia Romagna has developed a comprehensive programme called “Casa Amica” (“Friendly Home”) in order to ensure that elderly people and people with disabilities get access to information and receive advice about home environment accessibility and livability. This initiative, supported by regional legislation providing funding, has reinforced the role of two regional Centres of excellence: the Regional Centre for Assistive Technology in Bologna and the Regional Centre for Information on Architectural Barriers in Reggio Emilia.

One consequence of the Casa Amica programme was the creation in 2005 of a network of local resource Centres in each of the ten provincial capitals. These “first line” local resource Centres, officially called “Centri per l’adattamento dell’ambiente domestico” (Centres for the

adaptation of the home environment), are run and funded by the local authorities (with a contribution from the Region), and operate with multi-professional teams composed of professionals with a background in health, social work, technology/architecture and administration. They are directly involved in responding to the needs of individual citizens and of members of their families, as well as to care-givers or other public or private professionals such as architects, therapists, engineers, etc. who seek their services. They provide information and advice regarding the quality of life in the physical environment. More specifically, they are concerned with the organisation of the living environment, the functional use of available space, the removal of barriers, appropriate furniture and aids for daily living, the installation of complex AT solutions and of home automation, domotics, motors, building laws and regulations, and funding opportunities, etc. [1]

All services are provided free of charge to members of the public. The Centres can be contacted directly and, after a first phone enquiry during which the type of request is assessed, it is possible to fix an appointment, either in the centre or in the actual environment that needs to be assessed.

The two specialized regional Centres mentioned above represent a “second line” of operations. They play a vital role in training and supporting the local centre teams and intervene in cases in which a more complex assessment procedure is required.

The Regional Centre for Assistive Technology in Bologna has been operational since 2000 and was established by the Region to support the development of local resource Centres for Assistive Technology in the region. As such it has a regional function in training and awareness raising concerning the opportunities offered by AT to people with disabilities. The centre falls under the aegis of the Local Public Health Agency and is mainly staffed by the Ausilioteca AT team of AIAS Bologna onlus [2] and is housed in Corte Roncati. The centre’s main focus is on AT solutions for people with motor and multiple disabilities and in this regard its principal areas of concern are solutions for mobility, daily life, domotics, environmental control and man/machine interfaces. It provides a permanent exhibition/showroom where individual clients and professionals can work together with the team and where hands on training can take place.

The Regional Centre for Information on Architectural Barriers in Reggio Emilia provides information, advice and training concerning the physical accessibility of the built environment. The centre is staffed by professionals

from the European Centre for Research and Promotion of Accessibility.

The entire service delivery network of first and second line Centres is publicly funded and has no commercial interest.

II. SETTING UP THE NETWORK

The establishment of the local resource Centres was accompanied by the development of a training programme for staff members. Training was considered a priority given the need to homogenize service delivery across the region, especially with regard to the “identity” of the Centres and the “philosophy” underpinning their intervention. Moreover, a common training course was considered a good strategy for the promotion of collaboration between professionals, institutions and external agencies.

Many of the staff members were professionals with considerable experience in their specific work field but with limited knowledge and competence concerning accessibility issues, assistive technologies, etc. The training programme was designed and delivered by the two second line Centres. The aim was to provide staff members from different professional backgrounds (physiotherapists, educators, social workers, architects, construction and electronic engineers, administrators...) with the basic competencies to work effectively in the provincial Centres. An important part of the programme was dedicated to learning to work together as a team, integrating view points from different disciplines: health, social, technical, administrative.

More specifically, the training programme dealt with the following issues:

- Cultural approaches to disability and service delivery
- Legislation and regulation relating to assistive technology, accessibility and the removal of architectural barriers
- Low and high tech solutions for the adaptation of the domestic environment
- Accessibility of domestic environments, furnishings and functional use of space
- Service organisation: mandates, roles, other resources for expert advice
- Service delivery: giving advice, assessments, home visits, reporting

The training programme was delivered using a multidisciplinary approach in order to favour the development of a professional attitude among the learners that values the inclusion of the different points of view of team members in assessing and evaluating situations.

III. THE FIRST THREE YEARS OF ACTIVITY

The first Local Resource Centres opened in 2005 and their launch was accompanied by an information campaign. Given that 2005 was an incomplete start up year, the 1,179

requests for advice received by the network of 10 centres met expectations.

Priority was given in 2006 to putting down roots in local territories through increased collaboration with existing resource holders and agencies. The fact that many Centres are physically located in the provincial capitals brought with it the risk that rural areas might be poorly served. Additional service delivery initiatives had to be developed to cater also for these remote areas, for example through the setting up of mobile teams or the creation of additional contact points.

In 2006 a total of 3,398 requests for intervention were received [3], 1.760 from the disabled or elderly and 1.205 from professionals. Breaking down the figures (for non professionals) by age yields significant results (*figure 1*): 0-18 (11%), 19-64 (41%), over 65 (49%). This data shows that there is very real need for information and advice for people over 65. Data concerning client disability types (*figure 2*) is also highly significant: Physical (63%), Cognitive (4%), Sensorial (2%), Multiple (15%), Not classified (16%). Of the requests for advice received by the 10 Centres in 2006 (*figure 3*), almost 39% regarded the external home environment, 44% the internal home environment, 68% laws, regulation and services, 26% traditional aids and AT devices and 5% the services themselves.

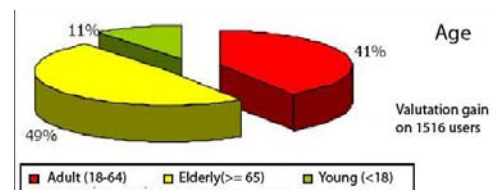


Figure 1

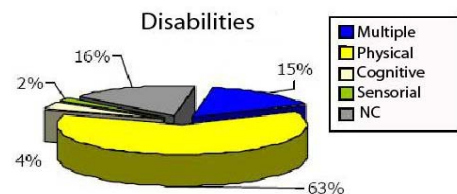


Figure 2

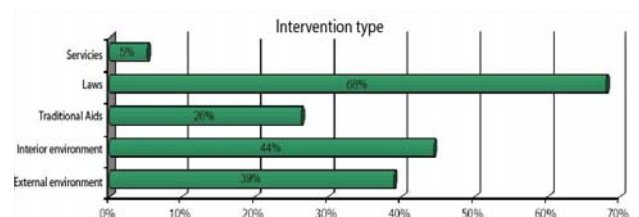


Figure 3

In 2007 the guidelines focused on operational integration through the development and delivery of

training at a local level. In response, the local resource Centres began provincial training programmes for interested professionals. These training programmes are supervised and their delivery supported by the second line Centres.

In October 2007 a new course was also organised by the two support Centres for new staff members.

Since 2007 the Centres have had a common website [4] providing information and contact details and a centralised database for the documentation of interventions. This permits the Region to have real time access to data concerning intervention type both at single Centre level and at the level of the entire network [5].

IV. CORTE RONCATI: AN “INCLUSIVE” BUILDING FOR INNOVATIVE SERVICES

In June 2007 the Centre for Assistive Technology and the Provincial Resource Centre of Bologna were transferred to a new seat called Corte Roncati.

Situated in the heart of medieval Bologna, Corte Roncati houses several highly specialized Centres in the field of diagnosis, rehabilitation and assistive technology. The buildings are grouped around the large courtyard of an old psychiatric hospital. The reconstruction of the complex (2005-2007) was successful in finding a balance between tradition and modernity, while the underlying concept was to shift from “segregation” to “integration” and from “exclusion” to “inclusion”.

Corte Roncati embraces Centres of local, regional and national importance. Two are in the clinical area:

- *The Michele Bottos Centre for Infantile Neuromotor Disabilities*
- *The Regional Centre for Linguistic and Cognitive Disabilities*

While four are in the area of Assistive Technology :

- *The Emilia Romagna’s Regional Centre for Assistive Technology*
- *The Public Health Agency Centre for Technological Aids*
- *The Provincial Centre for the Adaptation of the domestic environment*
- *The two domotized smart apartments for demonstrations and testing*

In addition there are shared garden areas for functional evaluation, play, relaxation and cultural events.

With the objective of going beyond the traditional concept of segregated medical and welfare services for the disabled, Corte Roncati offers clients the opportunity to develop a more holistic and long term “life project”. All the Centres, without losing their specific character, integrate their services with those provided by the others and offer assessments drawing on a range of professional competencies. Typically this service begins with a

diagnostic investigation and a functional evaluation and goes on to develop suggestions for rehabilitation and solutions to enhance autonomy and independence through the employment of technological aids, more advanced technologies and simple adaptations. The rehabilitation itself takes place elsewhere: it is carried out by professionals employed by those agencies and institutions which provide these services at community level. No aids are sold in the AT Centres, which have no commercial interest in the process and operate purely for the benefit of the client.

Corte Roncati represents an innovative model in Service Delivery to the elderly and people with disabilities in Italy as its integrated services and its focus on inclusion represent a shift from a model that sees them as disabled and isolated to a model that sees them as able and participating.

In order to promote the scientific and cultural development of professionals in the field, the Centres are also fully involved in training activities.



Figure 4: Corte Roncati by night as it is today

In the Assistive Technology Area the multi-professional AT team of AIAS Ausilioteca delivers AT services and training on behalf of the Public Health Agency of Bologna, the Emilia Romagna Region, and the City of Bologna. The team is also involved in delivering modules on AT in Higher Education (the University of Bologna). The focus is on (technical) aids for communication, computer access, environmental control, domotics, mobility, daily living and play, and a multidisciplinary approach is used in assessing individual needs. The Centres work mainly with people with disabilities - of all ages and in all environments: education, work, home, leisure, rehabilitation, etc. Their staff support AT professionals and their local teams in introducing AT in long term projects. Other activities include the provision of information, training, equipment, loans and research. The staff of the AT Area at Roncati is composed of 6 AT & ICT engineers/technicians, 3 physiotherapists, 6 pedagogues/educators, 1 architect, 3 administrators and 1 project manager.

V. CORTE RONCATI: AT SOLUTIONS

The whole Corte Roncati complex utilizes a control system employing building automation technologies [6]. Every single function has been domotized and a surveillance system monitors every aspect of the building. This allows for simplified control, the adoption of flexible energy saving polices, increased accessibility and comfort for users, and flexible management in the case of emergencies, not to mention the possibility of remote technical maintenance and intervention.

Corte Roncati houses a large exhibition area (about 300 sq m) which is dedicated to various areas of AT. One sector is permanently dedicated to AT and solutions for daily living and home adaptation.

This sector includes independent living solutions for people with disabilities and for the elderly (with both devices specifically designed for people with particular disabilities and for universal use) and areas where living environments are reproduced so as to allow testing and ergonomic evaluation.

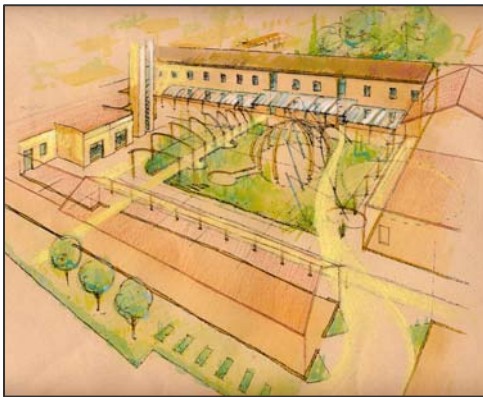


Figure 5: A preliminary sketch

VI. THE TWO “CASA AMICA” SMART APARTMENTS

The two experimental Casa Amica (“friendly home”) smart apartments are fully domotized and highly accessible. Constructed according to maximum usability principles, they are equipped with innovative technological appliances and are practical and liveable. They were especially designed to provide visitors with information, and health and social sector professionals, engineers, architects and technicians with an opportunity to assess and advise the elderly and people with disabilities.

They are also suitable for longer term independent living projects and they are used for this purpose by people who stay for short periods of time (about a week), during which they test their real capability of living independently and the newest solutions for this purpose.

The two apartments have been fully operational since the end of 2007 and are becoming a point of reference for

testing activities and for the enrichment of a culture of accessible project work.

The two apartments have different user targets and offer different solutions:

Apartment n.1 (approx 80 sq m) has a target of people with severe disabilities. Its main characteristics include: environmental adaptations, a high level of automation, interfaces for every kind of disability, a wide range of technical aids and “evident” domotic technologies.

Apartment n.2 (approx 50 sq m) has a target of people with medium/light disabilities and the elderly. Its main characteristics include: a wide range of technical aids, light adaptation solutions for daily activities, environmental adaptations, simplified controls, safety technologies and “hidden” domotic technologies.

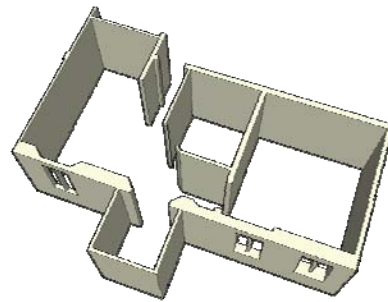


Figure 6: A 3D view of the Casa Amica apartment designed for the elderly

A. Project guidelines and the design team

The guidelines followed for the development of these apartments, which were influenced by the lessons learned from the first Casa Amica apartment (Bologna, 1999), can be summarized as follows: transferable solutions, market based solutions, a wide range of human/machine interfaces, usability, safety, definition of living models and scenarios, state of the art technologies, expandability, accessibility, compatibility, design for all, aesthetic considerations and bio-architecture. The project team was multi-professional and included technicians, architects, educators and therapists.

B. The domotic control system

The two apartments are equipped with a completely integrated domotic system (based on the KNX standard), which allows for the intelligent supervision of all functions, the implementation of scenarios, the communication of possible emergencies to the outside, passive alarms, intelligent functions, remote control and compatibility with a wide range of human/environment interfaces. The numerous technological systems which have been installed operate in parallel and are able to exchange information, thus permitting the apartments to be managed with a high degree of security, even in the case of serious disabilities. For safety and security

purposes the surveillance system and the telephone and the internet domotic gateways allow the system to communicate remotely, bi-directionally: some functions can be managed from afar and automatic signals which indicate the start up of some functions, or an emergency, can be sent to specifically authorized persons.

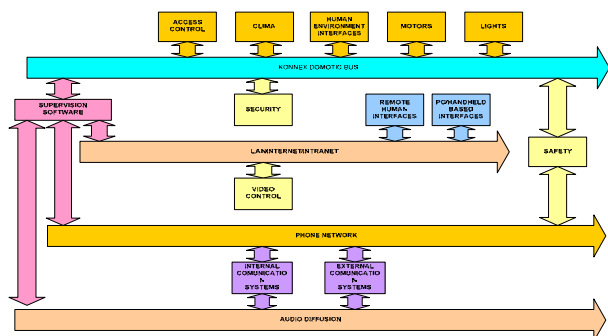


Figure 7. The technological architecture of Casa Amica smart apartments

C. An open system for a wide range of human/environment interfaces

Any project for the addition of new functions to the Casa Amica apartments has to first answer this question: “How can it be controlled and accessed?” This is an important requirement, because when new and complicated functions are introduced to a house, especially when dealing with people with disabilities and with the elderly, there is no escaping the necessity of giving careful consideration to the choice of control methods and devices, though it is customary to prefer the wall mounted universal buttons and the standard remote controls readily available on the market.

The technological endowment of the two apartments includes an extensive range of remote controls for general use as well as custom designed remote controls for people with specific disabilities or for the elderly. Most of the remote controls which govern the functions of the house are normal devices, but in addition to these there are special remote controls, such as highly simplified units for the elderly, voice based command units and scan mode based units with outside sensors for people with severe disabilities. Another highly appreciated feature is the use of presence and light sensors (for automatic light functionalities) and transponder RFID keys which do not require the user to perform specific actions: they are activated merely by movement through an area.



Figure 8: The RFID keys interface

Particular care was taken in the choice of wall controllers, which are coloured in order to be easily recognizable by visually impaired people and which carry a simple pictogram explaining their function. The governing idea was to ensure that the apartments would have as many interfaces and remote control devices as possible. In order to maximize compatibility, especially in the case of controls for disabled people and the elderly, infra-red technology was used for domotic receiving devices because radio systems often use proprietary signals which are difficult to reproduce.

All the functionalities which are accessible to people with disabilities and the elderly through these interfaces are also available to their companions through more traditional remote control methods, thus showing that in addition to producing gains in autonomy and safety, domotics can contribute to the comfort of all those who live in the apartment.

D. The applications

Besides these interfaces, the most important things that the Casa Amica apartments are equipped with are their fittings, which are the real operational arm of the whole system. Of these the most useful are the motor devices, especially for people with reduced movement capability, because they can replace movements that are too wide, too heavy, too dangerous or too delicate for them to perform. Access doors are equipped with an electrical lock opened by an identification system based on transponder RFID keys. All the passages are equipped with motors, for sliding open both outside and interior doors, for opening and shutting windows, shutters and blinds, and for controlling the air conditioning terminals and the roof-lights. All the motors and the lights can be controlled in many ways, because they are all connected to the bus system. The Casa Amica apartments also host a variety of solutions that can enhance communication inside and outside the building: a video entry phone with a LCD screen positioned on the doors and near the bed, a portable intercommunication system, hands-free telephones controlled via IR remote controls, emergency remote communication devices and so on.



Figure 9: A test with a simplified remote control used to control the domotic system

VII. DISCUSSION OF THE RESULTS

The network of Centres has definitely responded to a need in an area where there were very few or no public services at all. It does so by providing a wide range of services: information, advice, assessments at home, etc.

It is too early to judge the impact of the local Centres. According to many operators the services they provide still have to find a stable role in the network of services that the Region, the provinces and the municipal authorities have created to respond to the needs of people with disabilities. As a matter of fact, the impact of these Centres would be strengthened if their role were more widely recognised. The initiative to set up these Centres came from a higher administrative level than the level on which they have been implemented. Not all local authorities invest or interpret the role of the Centres in the same way. Efforts have to be made to further integrate the Centres in the existing policies and priorities of local authorities.

Although the Region's investment has been considerable, the Centres could have more impact if more resources were available. The Centres are reluctant to promote their services in a context of limited resources, both in terms of time and in terms of funding solutions. Appropriate resources and time for home visits and follow up support would make interventions more effective.

Providing information and advice is an important service that can help people to improve the quality of their lives. Nevertheless, it is only a first step in a longer process involving decision making, designing solutions, spending money for adaptations, etc. In particular, the financial implications of certain solutions are often an obstacle to positive outcomes. A survey of 30 individual Centre clients in Bologna and Ravenna carried out in 2006 revealed that only 16 of them had actually acted on the advice of the Centres. The main reasons given for not doing so were firstly the costs and secondly a change in the health conditions of the clients. Nevertheless, of the 16 individuals who acted on the advice they received, 15 indicated that the quality of their lives had improved [7]. If more funding were available to pay for the actual

adaptation, the Centres could make an even greater contribution to the welfare of their clients.

The first year of activity of Emilia Romagna's Regional Centre for Assistive Technology and of The Provincial Centre for the Adaptation of the domestic environment of Bologna in the Corte Roncati complex has demonstrated how useful a large showroom display of solutions and two completely equipped demonstration apartments can be for assessment activities.

The know-how acquired in the course of designing, setting up and testing Corte Roncati's integrated systems, and in particular the two apartments, is highly relevant to both ordinary assessment activities and to research and development projects.

REFERENCES

- [1] Regional Act 29 (1997) reimburses up to 50% of the costs for personalised solutions to enhance the independence of people with severe disabilities. National Act 13 (1989) makes funding available on an annual basis for the removal of architectural barriers in the homes of people with disabilities. Moreover, there are tax breaks for those who acquire Assistive Technologies and for the removal of architectural barriers in the living environment of people with disabilities.
- [2] [AIAS Bologna onlus is an organisation of people with disabilities and their family members. The organisation has an Assistive Technology Team with more than 30 years of experience in enabling people with disabilities to benefit from available technologies. The team also operates the Local Health Agency Centre of Technological Aids in Bologna.
- [3] Relazione sulla rete dei servizi di informazione e consulenza per l'adattamento dell'ambiente domestico per anziani e disabili. Attività anno 2006. Regione Emilia Romagna, Direzione Generale Sanità e politiche Sociali, 2007.
- [4] <http://www.centricasaamica.emilia-romagna.it>
- [5] E.-J. Hoogerwerf, C. Bitelli, V. Brandan, L. Sciuto, D. Trioschi. "Quality of life, accessibility and liveable home environments: a recent service delivery initiative in Emilia Romagna." Challenges for Assistive Technology, AAATE 2007 IOS Press, 584-588
- [6] M. Malavasi, C. Bitelli, E.-J. Hoogerwerf. "Corte Roncati: an example of innovation in AT service delivery and inclusive building." Challenges for Assistive Technology, AAATE 2007 IOS Press, 584-5
- [7] Carpinelli. "Abitare e disabilità: Analisi delle problematiche; L'operatività dei C.A.A.D. e valutazione del servizio." Università degli studi di Ferrara. Corso di laurea in Fisioterapia. A.A. 2005/2006.