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Innovation in Care Services for the Elderly

FARIDAH DJELLAL and FAÏZ GALLOUJ*

Ageing and innovation are usually considered to be contradictory phenomena. This article on innovation in care services for the elderly seeks to counter this established view. Taking as its starting point a definition of care services for the elderly that draws on the economics of services, the article advances a simple framework for analysing innovation in terms of 'targets'. These targets, which make it possible to circumvent the usual economic categories (product and process innovation), are as follows: the various forms of assistance and residential provision for the elderly, the (tangible and intangible) technologies deployed, the services provided, the human environment (carers and relatives) and the institutional environment.

Key words : innovation, elderly services, technologies, residential facilities

INTRODUCTION

Against the background of an ageing population and a considerable increase in the wealth of the elderly population, care services for the elderly have for some years been a particularly dynamic sector in developed economies. However, they constitute an activity that is not easily defined. Firstly, 'care services for the elderly' do not fall into a single accounting category. Secondly, they are located at the intersection of various other major groups of activities: the services (of whatever kind) consumed by elderly people, health services, local services and so on. Finally, they are provided through a multiplicity of different mediums. They should not be reduced to those operations performed on elderly individuals themselves. They are much wider in scope and encompass all operations performed on elderly people's environments, whether those environments be tangible, intangible or human (housing, relatives, carers, etc.). They are also highly dependent on the institutional environment that regulates them. The extreme diversity of

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these services and the difficulty in clearly identifying them have at least two consequences for the innovation problematic. Firstly, they make it difficult to identify innovation. Secondly, they fundamentally extend its sphere of application.

The aim of this article is to illuminate the diverse aspects of innovation in this type of activity. It is based on a survey of the national and international literature and on a series of interviews with professionals working in the area. Thus one of our objectives is to identify cases of innovation by emphasising their diversity and hence the inability of the existing statistical classifications to capture them. However, our principal objective is to develop an analytical framework that can be used to organise that diversity. Thus this article seeks less to theorise the innovation problematic in this particular sector than to provide a simple framework for identifying innovation.

The article is divided into six sections. In the first section, the difficulties of defining, identifying and marking the boundaries of the activities involved in the provision of care services to the elderly are considered. Also in this section, a very simple framework for the analysis of innovation in care services for the elderly is outlined. This framework, which is developed both deductively and inductively, rejects direct use of the usual typologies of innovation (product and process innovation) by emphasising the main possible targets for innovation in the sector. The following sections examine these various targets in detail. The first object of investigation is the tangible and intangible environment, that is the forms of assistance and residential provision and the technologies deployed. The focus then switches to the human environment, that is the family and professional carers or helpers. Finally, we turn to the institutional environment and to institutional innovation, that is the various regulatory mechanisms (both public and private) put in place to support supply and demand: certification or accreditation procedures, funding procedures, the establishment and monitoring of standards, etc.

CARE SERVICES FOR THE ELDERLY: FROM THE DEFINITION OF A COMPLEX SERVICE TO A TYPOLOGY OF INNOVATION TARGETS

It is difficult to define and identify the activities involved in the provision of care services for the elderly. Firstly, care services for the elderly do not constitute a clearly identifiable accounting category. Secondly, any attempt to define these activities comes up against two semantic ambiguities in the notions of ‘care’ (which encompasses different types of activities) and ‘elderly persons’ (which requires an arbitrary threshold to be fixed, beyond which an individual topples

into the elderly category). Finally, care services for the elderly also overlap with other categories, which are themselves only very vaguely defined. This is the case, for example, with local services, a catch-all category that captures the externalisation of domestic work.

From the Service Triangle to the Care Services for the Elderly (CSE) Polygon

The economics of services provides us with an analytical framework that can be used to account satisfactorily for the provision of care services to the elderly. In its basic version, this framework, known as the ‘service triangle’ (Gadrey, 1996), defines any service as a set of processing operations carried out by the service provider on a medium or a target (Bancel-Charensol and Jougleux, 1997) that has various links with the customer but without producing a good able to circulate economically independently of that medium (the P-C-S triangle in Figure 1). These processing operations seek to change the state of the medium in various ways. The principal mediums considered are the following: goods or technical systems, codified information, the physical or intellectual characteristics or spatial location of individuals themselves (customers, users) and organisations in their various aspects (technologies, structures, competences and collective knowledge). The nature of the processing operations (repair, transport, maintenance, transfer, management, analysis etc.) is obviously a function of the type of target or medium under consideration.

In the case of care services for the elderly, the customers (recipients of the services) are elderly persons and, if a medico-social definition of care is adopted, the mediums for the service are the physical and intellectual characteristics or mobility of the individuals themselves. However, any other medium can be envisaged if a wider definition is adopted.

In reality, if we wish to take account of certain specificities of care services for the elderly, the representation must be made more complex without, however, fundamentally changing the definition (cf. Figure 1). In order to produce a more precise definition and representation of care services for the elderly, the initial triangle may usefully be supplemented by introducing (Gadrey, 1994):

- 1) the regulatory system, that is all the (public and private) institutions that carry out evaluation, certification, monitoring and funding functions;
- 2) the wage relationship between the agents providing the care services and the providing organisation, when it exists;

3) the elderly person's family, which may give instructions or provide various forms of service, particularly for elderly people still living in their own homes. Where applicable, (S,C,P') constitutes another service triangle, which may either replace the services delivered by the professional provider (P,C,S) or supplement them. It should also be noted that families themselves may receive assistance as part of support programmes for carers;

4) the intermediaries, particularly voluntary associations or other organisations that act as proxies or representatives, provide information or advice, make recommendations etc.

The introduction of these various actors leads to the replacement of the initial service triangle by a service polygon.

insert FIGURE 1: FROM THE SERVICE TRIANGLE (DOTTED LINES) TO THE CSE POLYGON (the relationships within the polygon are not exhaustive) (adapted from Gadrey, 1994)

The Targets of Innovation in Care Services for the Elderly

The definition of care services for the elderly outlined above, and its representation by the service polygon, highlight the mediums on which the service is performed and the various actors involved. They also provide us with an heuristic device that can be used to identify, directly or indirectly, the possible targets for innovation in the provision of care services for the elderly. This (somewhat) deductive approach is not in itself sufficient. It also has to be checked against reality. Thus by comparing the service polygon (which provides a virtual topography of the possible loci of innovation) with a survey of the national and international literatureⁱ and our own preliminary empirical investigation, the following targets can be identified (cf. Figure 2):

1) The structures or, more generally, the forms of assistance and residential provision. We are dealing here with service-providing organisations (O) in the broad sense of the term, that is organisational methods of service delivery in their diverse forms (institutions, domiciliary services, networks, etc.). This means that several structures or organisations (in the strict sense of the term) can contribute to the development of a form of service provision: not only residential facilities but also external service-providing organisations (voluntary associations, companies, etc.). These two groups constitute potential targets for innovation.

2) The technologies. These are a set of tangible or intangible artefacts (technical systems, architecture and ergonomics, methods, etc.).

These first two targets constitute what might be termed the tangible and intangible environment for the provision of care services to the elderly.

3) The elderly person's family (P'), which may be one of the main providers of services for the elderly or simply act as an intermediary or giver of instructions. In some cases, it may even be the beneficiary (or joint beneficiary) of the services.

4) The caring personnel or, more generally, the service-providing agent (P).

These last two targets constitute the human environment within which care services for the elderly are provided.

5) The services provided to the elderly, which vary depending on the service medium in question (the various characteristics of the elderly individuals themselves, the goods they possess or use etc.).

6) The institutional environment (I), which has been a particularly important target for innovation for some years. This institutional environment plays a fundamental role in shaping the other innovation trajectories.

These various innovation targets are 'deduced', one might say, from the basic definition of the notion of care services for the elderly. They are, therefore, stable and enduring. It is this structural character, this degree of generality and this durability that enable us to contemplate using these targets as a typology of innovation with a certain degree of confidence.

insert FIGURE 2: TARGETS FOR INNOVATION IN CARE SERVICES FOR THE ELDERLY

The various targets can obviously overlap with each other. The launch of a new form of assistance or residential facility may be accompanied by the implementation of new technical systems, experimentation with diagnostic or therapeutic strategies, the provision of new services or innovation in the organisation of the human environment (professional caregivers or relatives of the elderly person). Nevertheless, these different forms of innovation can also emerge in existing establishments.

In our view, it is much easier for the professionals involved in the provision of care services for the elderly to identify innovation in terms of 'targets' than by using the distinctions economists have traditionally made between product, process and organisational innovation. After all, in some situations these distinctions prove difficult to put into effect, in both theoretical

and practical terms. The target-based approach adopted here avoids these difficulties but without abandoning these useful and necessary categories. Thus, for example, the ‘type of assistance or residential facility’ target equates to organisational innovation in the broad sense of the term. It encompasses both the construction of new facilities (in the architectural and internal organisational sense) and the establishment of new relationships between the various contributors to the provision of care services (external relationships, networks). Technical systems, when used by service-providing organisations as a replacement for personnel, are usually process innovations. However, they may also constitute product innovations (this is commonly the case in home help services). As for the (new) services provided, they are obviously product innovations, but the provision or marketing of such services may depend on process and organisational innovations, which makes it difficult to separate out the various forms of innovation.

We now need to examine in greater detail the main ‘targets’ for innovation in care services for the elderly. Our aim is not simply to list examples of innovation for each of the targets identified. Over and above this auditing of the existing provision, we seek to explore and organise the ‘black boxes’ that these targets constitute in order to gain some insight into the mechanisms that shape innovation and, from that starting point, to develop a general analytical framework.

THE TYPES OF ASSISTANCE AND RESIDENTIAL FACILITIES PROVIDED FOR ELDERLY PEOPLE

This first target encompasses the various forms of assistance and residential facilities provided for the elderly. It constitutes a significant reservoir of innovation, which is heavily influenced by national institutional dynamics. The ‘topography’ or general structure of this target can be said to be the same in all European countries, in that the various forms of assistance and residential facilities exist everywhere (as generic types or ‘dominant designs’), although their respective shares vary. On the other hand, the innovation trajectories, whether they involve the rise to prominence of one form of provision at the expense of another (horizontal innovation trajectories) or a proliferation of variants within a generic type (vertical innovation trajectories), differ in accordance with economic, cultural and institutional dynamics.

The Topography of the Forms of Assistance and Residential Facilities Provided for Elderly People

National accounts are a valuable tool for conducting a topographical exercise of this nature. In France, for example, they can be used to identify the following different types of assistance and residential facilities provided for the elderly: 1) establishments for the elderly and 2) domiciliary provision (Neiss and Rouveira, 1996; Neiss, 1998).

In France, establishments for the elderly can be divided into two groups. The first group, which is the responsibility of local authorities and *départements*, is made up essentially of residential care homes and sheltered housing facilities (a block of small independent dwellings with optional collective services, such as catering, health centre, etc.). The second group consists of long-term care establishments, or nursing homes, which are attached to hospitals and cater for elderly people who are no longer able to manage on their own and whose condition requires constant medical observation.

Domiciliary services, which may be provided either in the elderly person's own home or in sheltered housing facilities, are also generally divided into two groups: 1) home help services (preparation of meals, shopping, cleaning and other housework) and 2) personal care services (daily assistance with personal hygiene, nursing care etc. as prescribed by a doctor). These services can be delivered by various types of providers.

However, these official categories tend to conceal the diversification of or changes in the various forms of assistance and residential provision. In other words, they do not capture innovation.

More generally, and simplifying matters somewhat, the topography of this first 'target' can be said to be organised around four types of provision, the first of which falls within the scope of the informal sector and the other three within the formal sphere (Figure 3). They are: 1) 'informal' care in the home; 2) 'formal' domiciliary services; 3) intermediate forms of provision; 4) institutions.

insert FIGURE 3: THE GENERAL TOPOGRAPHY OF THE FORMS OF ASSISTANCE AND
RESIDENTIAL FACILITIES PROVIDED FOR ELDERLY PEOPLE

In other words, the forms of assistance and residential provision are located along a spectrum, at one end of which are those services designed to support elderly people living in their own homes (domiciliary support services) and at the other residential provision in institutions of one kind or another. Between these two extremes are a number of intermediate forms of provision.

The first group of services, domiciliary support services, can be provided informally (that is by family members, generally women: wives, daughters, daughters-in-law) or formally (through the 'market' and/or networks, that is by recruiting professionals to provide market services, whether they be employees of a firm, voluntary association or of the elderly persons themselves). These two modes of provision, the formal and informal, are usually combined.

The intermediate forms of provision come into play when elderly people leave their own homes and are integrated into a network of service providers, who can be differentiated on the basis of the nature of the services provided, legal form, mode of mobilisation, etc. The archetype of these intermediate forms is sheltered housing, which began to expand in France from the 1970s onwards.

The formal provision of domiciliary support services and the various intermediate forms of provision both bring the supply of care services for the elderly into the market and/or network (in a variety of different configurations). In other words, the care services are externalised and delivered through the market (in the case of market services) or networks (in the case of services provided by professionals paid by voluntary associations or public organisations that are part of support networks), or a combination of the two.

Institutions, finally, are the form of residential provision whose counterpart as a form of governance is management control (hierarchy). After all, this is a form of collective residential provision in which elderly people are given the basic services they require (accommodation, catering, laundering etc.) within an institution. The archetypes of the institution are old people's homes and long-term hospital care.

However, it is important to qualify this general framework.

1) The four groups of services described above are obviously ideal types. They certainly equate to what evolutionary theorists in the economics of innovation call 'dominant designs' (Abernathy and Utterback, 1978), 'technological guideposts' (Sahal, 1985) or even 'technological regimes' (Nelson and Winter, 1977), that is basic artefacts whose fundamental structure has a certain durability, even though these artefacts take a variety of different forms in space and over time.

2) The boundaries of the various groups are not strictly defined. Some forms of provision may be located on the boundary of several groups, and allocating them to one group rather than another may create difficulties.

3) Informal provision (that is, non-professional assistance provided by families) can also co-exist with formal or professional forms of provision. This applies not only to formal domiciliary support services but also to the intermediate forms of provision and to institutions.

4) Nevertheless, the groups at either ends of the spectrum may be supplemented in certain situations. Thus an elderly person receiving assistance to stay in their own home (whether in the informal or formal sphere) may from time to time move temporarily into an institution, for example one providing what is known as respite care (cf. below).

Innovation Trajectories

The innovation dynamic in the forms of assistance and residential provision can be considered in two different ways (which are not contradictory and may refer to different temporalities). In the first, the focus is on what might be termed a ‘horizontal’ innovation trajectory, which describes the transition from one dominant design to another. In the second, the trajectory is a vertical one that describes the evolution within a dominant design.

Horizontal innovation trajectories. These trajectories describe the evolution of the various forms of service provision along the axis delineated by the topographical analysis outlined above. Hence they reflect a change in the dominant design. They are strongly influenced by cultural and institutional determinants, but the market environment in which choices are made also plays a fundamental role. Thus in Southern European countries (Greece, Spain, Italy and Portugal), care provided by the family continues to be regarded as the preferred form of provision for the elderly, whereas in Northern European countries (Sweden, Denmark, the Netherlands and Finland), the preference is for specialist institutions (Assous and Ralle, 2000; Valetas, 2002).

In France and other European countries, the horizontal trajectory has for several years been evolving through a shift from ‘management control’ (hierarchy) towards the ‘market’ and/or networks. In other words, the movement has been in the following direction: institution ----> intermediate forms of provision or institution ----> domiciliary support services (Figure 4). Thus the horizontal innovation trajectory has been driven by a preference for various types of

domiciliary support services and their corollary, that is a diversification of provision and innovation in the organisations providing the corresponding services. This horizontal trajectory has also involved the substitution of institutions by intermediate forms of provision that are better integrated into the social system. Thus in France, there has been a move away from large-scale institutions (the archetype of which is the old people's home) to smaller establishments (Argoud, 2000). These horizontal evolutions are explained both by the scarcity and high cost of places in residential facilities and by the unattractive image of such institutions (Fior, 1999), which goes back to an earlier perception of them as places that nobody leaves except in a coffin.

This horizontal trajectory is not specific to France. Thus in the UK, Sweden and Denmark, there has been a similar trend towards a reduction in long-stay hospital care for the elderly (institutions) in favour of smaller establishments supported by professional services (intermediate forms of provision) (Hugman, 1994; OECD, 1996; Henrard, 1999). Denmark in particular has put in place 'a general policy of providing sheltered housing with support from professional services', which has led to a considerable reduction in the number of elderly people in institutions.

insert FIGURE 4: HORIZONTAL INNOVATION TRAJECTORIES IN THE FORMS OF ASSISTANCE AND RESIDENTIAL PROVISION FOR ELDERLY PEOPLE

Vertical innovation trajectories. The innovation trajectories that we describe as 'vertical' (Figure 5) reflect the diversity or diversification of provision within each group of services (that is within each dominant design). Our purpose here is to provide some illustrations and to attempt to understand the criteria influencing the direction taken by innovation trajectories.

insert FIGURE 5: VERTICAL INNOVATION TRAJECTORIES IN THE FORMS OF ASSISTANCE AND RESIDENTIAL PROVISION FOR THE ELDERLY (the ranking of the examples given does not reflect any organised progression in the trajectory)

1) Informal support for elderly people living in their own homes has a weak capacity for diversification, precisely because of the informal nature of the assistance provided. By way of example, however, we should mention schemes for placing elderly people in host families, home share schemes (in which an elderly person shares his or her home with someone in exchange for

certain domestic services) and experiments with so-called intelligent dwellings or ‘smart homes’, that is dwellings adapted technologically and architecturally to the needs of the elderly. However, these experiments do, it is true, belong essentially to the technologies target (cf. section below).

2) Formal domiciliary support services also owe their capacity to evolve to changes in the configurations of the service networks of which they are a part. Thus the evolution of this form of provision reflects the evolution of and innovation in not only the ‘services provided’ and ‘service-providing organisations’ targets but also the ‘technologies’ target (smart homes, for example). Hospital services provided at home are a variant of this general form of provision for the elderly.

3) There are many different intermediate forms of provision and they have a great capacity for diversification. The trajectory driving them is the desire to replicate, as far as possible, the old person’s own home (Roger, 1999), but one that is integrated into a network of internal and/or external support services. As with the home-based forms of provision, the evolution of these intermediate forms depends on innovation in the service-providing organisations (new services, new types of service providers, new modes of service delivery, etc.). This trajectory is driven by some of the following criteria (some of which are not independent of each other):

- human scale;
- integration into the external social environment. This criterion is illustrated, for example, by the development of local facilities such as grouped housing schemes. These are residential facilities located in an elderly person’s own environment (in his or her district or local area) in which each individual has his or her own dwelling and receives support services (Neiss, 1998);
- the rise to prominence of the (internal or external) service relationship;
- temporary use of the service. This is the case, for example, with temporary accommodation facilities intended to deal with short-term problems, such as the family’s temporary absence, the unsuitability of the elderly person’s normal residence in winter, etc. (Neiss, 1998; Badeyan and Colin, 2000);
- à la carte flexibility and freedom of choice in carrying out some of the basic acts of daily life and recognition of individuals’ changing needs as they grow older and become increasingly dependent.

The numerous intermediate forms of provision for the elderly that exist in France can be illustrated by the following examples (Gallouj, 1996, after Argoud, 2000):

- ‘Grouped homes’: these are independent dwellings located in a single block or development that are let to elderly tenants on the basis of ordinary rental agreements. Residential provision of this kind is not captured in the statistics.

- ‘Supported housing schemes’: these are small sheltered housing schemes in which the elderly persons are subtenants of an intermediary (voluntary association, local authority welfare centre). The intermediary buys in services from external providers in order to support the elderly people in their substitute homes.

4) The following are the main trajectories driving innovation in the ‘institutions’ group: i) a reduction of establishment size (internal social environment); ii) specialisation in a specific pathology, particularly extremely disabling pathologies such as Alzheimer’s disease and psychiatric illnesses. Of course, these two technical criteria (size, specialisation) encompass many other more qualitative objectives (humanisation, decentralisation, well-being, etc.).

Taking old people’s homes as a starting point, it is possible to trace the major stages in the vertical innovation trajectory in the ‘institutions’ group of services in France. Old people’s homes are an outdated form of residential provision characterised by overcrowding and the concentration of residents in ‘collective spaces’ (particularly dormitories). The residential homes that are replacing the old mass institutions are much smaller and more functional in architectural terms. Residents have their own rooms and the healthy elderly can be separated from the bedridden or chronically sick. The building programme that began in 1974 led to the construction of industrialised, hospital-like units known as V120s because they had 40 medium-stay beds and 80 long-stay beds. From the mid-1980s onwards, small accommodation units for 10-15 people of similar levels of dependence were set up within residential homes, which were henceforth called residential care homes for the elderly (*maisons d’accueil pour personnes âgées*, or MAPA, in French). At the same time, nursing homes also began to be set up (*maisons d’accueil pour personnes âgées dépendantes*, or MAPAD). The next stage of development saw the creation within nursing homes of small, separate accommodation units (known as Cantou units) for elderly people suffering from dementia. The Cantou category now encompasses a great diversity of forms of provision that Gallard (1996) groups together under the term ‘group residences of a communal nature’. The following are the main features they have in common: i) they are small (human scale)ⁱⁱ and adapted to particular forms of dependence; ii) they are the result of experiments conducted by voluntary associations, initially without any encouragement or support from the public authorities (even though such encouragement and support may subsequently have been forthcoming); iii) they were difficult to identify initially for this reason.

Another form of provision has emerged within the ‘institutions’ category. This is what Gallard (1996) calls ‘group residences of the hotel type’, which are small establishments (large apartments, small retirement homes) in which the personal space is generally the bedroom and considerable use is made of collective services and specialist staff (employees of the operating organisation for the most part). What sets them apart from the ‘group residences of a communal nature’ (Cantou category) is that support staff are permanently present in the communal residences. Similar vertical innovation trajectories are at work in all developed countries, although it is not our aim here to examine them in any detail. We will simply note that most of these countries have put in place specialist units for the treatment of dementia. Thus Holmes, Teresi and Ory (2000) devote a jointly authored book to the various forms of residential provision and care for elderly people with Alzheimer’s disease and dementia in Europe, the USA and Australia.

To conclude this section, it should be pointed out that some forms of residential provision are common to both the ‘institutions’ and ‘intermediate forms of provision’ categories. For example, night care services, day care services or even temporary accommodation can be provided within existing institutions (residential homes etc.) or organised as separate, specialised intermediate forms of provision. It should also be added that other organisational innovations (which this time do not fall within the scope of the accommodation function) can emerge within the ‘institution’ category. This applies, for example, to the gerontology centres that are being set up in some hospitals. These are specialist external consultation centres that bring together experts from various disciplines (geriatricians, neuropsychologists, neurologists, psychiatrists, ophthalmologists, speech therapists, physiotherapists, etc.) and make use of specific technologies (MRI, brain cobalt therapy, for example).

Innovations affecting the ‘forms of assistance and residential provision’ target are above all organisational innovations, since they manifest themselves in the establishment of an organisation in the broad sense, that is both an internal organisation and a system of external relations, etc. However, a new form of assistance and residential provision cannot be reduced to its organisational structure. It is also a vehicle for a new content that may affect one or more or even all of the other targets of care services for the elderly (technical systems, processing, services provided, personnel, etc.) and give rise to product or process innovations. From this point of view, a new form of provision for the elderly equates to what marketing experts call a ‘new concept’ (new type of hotel, restaurant, hypermarket, etc.).

TECHNOLOGICAL TARGETS

The second target of innovation is technology. In care services for the elderly, as in other service sectors (Sundbo, 1997, 1998; Metcalfe and Miles, 2000 ; Gallouj, 2002 ; Djellal and Gallouj, 2005), this target of innovation has received a good deal of attention in the literature. A new discipline – gerontechnology - has even emerged.

This is also a particularly heterogeneous target, the main discriminatory criteria for which are the following: 1) the location of the technologies, 2) their object or purpose and 3) their nature. After all, some technologies are introduced into institutions (residential facilities and service-providing organisations), others into dwellings (including the substitute homes made available through the intermediate forms of provision) and yet others into all these various places at the same time. Some of them, finally, are used to link the various entities (this is the case with telematics, for example).

The object of these technologies may be to process (or treat) the elderly person's state of health (medical treatment in the strict sense of the term). However, they may also have other purposes: i) to provide help with daily living (the terms 'domestic technologies' or 'back-up technologies' are sometimes used), ii) to process the elderly person's living environment in various ways (information processing, material processing, architecture [in the sense of materials processing, processing of spaces, etc.]), iii) to offer technological support to service providers. In the first case, for example, this would involve providing technical assistance with some of the tangible and intangible aspects of daily life, in particular mobility and the alerting of carers or service providers (in the event of an incident, for example). In the second case, it would involve improving the working of the elderly person's residential facilities in various ways, including for example its technical management system and the technologies used to provide the main services. In the third case, it would involve all the 'technologies' used by the service-providing organisations in delivering their services. In the interests of simplicity, and despite the fact that there are certain areas of overlap, a distinction is made here between those technologies that have a medical purpose (in the strict sense of the term) and those that have a non-medical purpose. Finally, as far as the nature of the technologies is concerned, a distinction has to be made (whenever possible, which is not always easy) between tangible technical systems and intangible technologies. Once again, however, it is not unusual for the two to be deployed simultaneously.

In the interests of simplicity, we will ignore the first criterion (location). This makes it possible to construct a typology of technological targets by combining the criteria pertaining to

object or purpose (medical/not strictly medical) and those pertaining to the tangibility or intangibility of the technology in question (cf. Table 1).

However, this typology, and the corresponding table, have to be qualified as follows.

- 1) The dividing line between medical and non-medical innovation is not always clear. For example, remote surveillance could be said to fall within the medical sphere when it is used in a hospital room to alert nursing staff. Conversely, it should be allocated to the non-medical sphere when it is used in an elderly person's dwelling as an alarm system for alerting the family.
- 2) The dividing line between tangible and intangible technologies is not always easy to establish. This is particularly so in the case of architectural innovation and ergonomics. After all, innovation in these spheres sometimes has tangible and intangible aspects, inextricably combined with each other. Similarly, the methods used to assess dependence, for example, may be manifested physically in computer programmes and systems.
- 3) We have deliberately attributed a restrictive meaning to 'processing of the residential environment'. The term essentially denotes the tangible and intangible aspects of the organisation of the services delivered within the institutions and the intermediate forms of provision categories. Consequently, the architectural aspects fall not within this dimension but rather within the 'assistance with daily living' dimension.

insert TABLE 1 : A TYPOLOGY OF TECHNOLOGICAL TARGETS IN CARE SERVICES
FOR THE ELDERLY

Tangible Technologies

The tangible technologies are the best known and most spectacular. It is these technologies that are most clearly illuminated by national and international statistical tools. The OECD's Oslo Manual (1997), for example, is concerned solely with product and process technological innovations.

These tangible technologies include, firstly, technical care systems, whether they involve the introduction of specific technologies to provide care for the elderly or the application to this specific sphere of generic technologies used in other situations. Examples of this first group include telemedicine, remote surveillance, tele-rehabilitation and various medications (biomedical or bio-pharmacological innovations). The second group consists of technologies deployed to provide help with everyday living, that is all the technical systems that assist elderly people (which may be installed in a residential care facility or in an elderly person's own home): alarm technologies, aid technologies, architectural technologies and consumer and capital goods adapted for elderly users. A third group of technologies includes all the technical systems deployed in the management of residential facilities and the organisation of the services provided in them (computer systems, catering, cleaning and laundering technology). Finally, there are the technical systems deployed by service providers in order to deliver their services (equipment for transporting individuals, equipment for delivering meals on wheels, computer systems).

However, the question of the relationship of technology and (tangible) technological innovation to elderly people or, more generally, to age is more complex and multifaceted than the above analysis would suggest. It can, after all, be considered from a number of different perspectives, in particular by making a distinction between:

- 1) new technologies specific to old age: these are technologies developed specifically (and exclusively) to meet the needs of the elderly (particularly the dependent elderly). They include, among others, the development of new types of wheelchairs and hip protectors (to reduce the incidence of fractures of the neck of the femur in the event of a fall). It should be noted that these specific technologies may subsequently lose their specificity and be applied to the public at large (e.g., simplification of the programming and operation of domestic audio-visual equipment);
- 2) non-specific traditional technologies that have to be adapted to the declining capacities of elderly people: these are technologies used by the general public (in consumer and capital goods) that are familiar to the elderly from their previous use of them but now present

obstacles because of an age-related decline in (visual, motor, auditory) capacities. This is the case, for example, with telephones, ticket machines, petrol pumps, bus and train tickets etc.;

3) non-specific new technologies that also have to be adapted for use by the elderly: these are also technologies that are universally used but are new. The most obvious case is the Internet, which requires its interfaces to be adapted before it can be used by some elderly people (special mouse, keyboards, screens, etc.).

In these last two cases, there is, as it were, a need to combat ‘inadequate mastery of the social tools of everyday life’, that is ‘technological illiteracy’ (Bouchayer and Rozenkier, 1999), which is a cause of marginalisation and social exclusion.

insert TABLE 2: TANGIBLE TECHNOLOGIES AND THE ELDERLY

In particular, adopting this perspective enables us to enrich our analysis of tangible technologies that have a non-medical purpose.

Other perspectives on the relationship between technological innovation and ageing can also be adopted. We can do no more than mention them here. Firstly, there is the question of elderly people’s propensity to adopt innovations. It is often argued that elderly people tend to have a somewhat conservative attitude that manifests itself in a certain reluctance to adopt innovative products (cf. Collerie de Borely, 1998; Bouchayer and Rozenkier, 1999). At the macroeconomic level, there is also the question of the impact – often regarded as negative - of an ageing population (and the increasing number of retirement facilities) on the resources allocated to technological development.

The European Union, it should be noted, has instigated several research programmes on the relationship between ageing and technologies that cover most of the themes alluded to above (cf. Bouchayer and Rosenkier, 1999). They include:

- the TIDE programme (Technology Initiative for Disabled and Elderly) (1991-1994 and 1994-1997), whose objective was to develop prototypes of products or technical systems. These technologies were divided into three groups: those intended for the carers of the elderly or handicapped, those intended for elderly or handicapped individuals themselves and those aimed at the general public while at the same time taking account of handicaps (particularly those linked to age);

- the 4th and 5th framework programmes (1995-1998 and 1999-2002, respectively), which included a number of initiatives in the general area of ageing and technologies;
- the COST (Co-operation in European Science and Technology) networks, set up with the aim of promoting coordination and networking among European researchers. The networks included: COST A5 (Ageing and Technology), COST A4 (Social Shaping and Technologies), COST 219 (Telecommunications for the Disabled and Elderly) and COST 335 (Passenger accessibility of heavy rail systems);
- the ETAN (European Technology Assessment Network), set up to promote coordination and networking among researchers and decision-makers in science policy; since 1997, one of the network's themes has been 'The ageing of the population and technologies: challenges and opportunities'.

Intangible Technologies

There are also very many intangible technologies (they could equally well be described as invisible) at work in care services for the elderly. Once again, a starting point for analysis is simply to divide them into two groups, the first (and particularly large) one consisting of those deployed in medical treatments of one kind and another, the second of those deployed for other purposes (services, management, etc.) (cf. Table 2).

Medical intangible technologies. The first group of intangible technologies, those deployed in medical treatments, contains two particularly fertile sub-groups, particularly in the light of papers given at recent international gerontology conferences (Gerontology, 2001). They are, firstly, measurement or diagnostic methods and, secondly, therapeutic strategies.

Measurement and diagnostic methods constitute a particularly fertile area of research and innovation directed at a multitude of different targets: assessment of the degree of dementia, of risk (of a fall, for example), of dependency, of memory, of pain (which may be applied in different ways to different types of patients, particularly those unable to speak), the design of indicators of well-being adapted to the elderly, quality of life indicators (Dubuissin and Gardeur, 200), etc. Innovation trajectories in this sphere are driven by the following factors: the object or target of measurement, the initial level of application (local, national, international) and the degree of novelty in the method.

Thus there are a multitude of international assessment scales (Borrel, 1996 ; Dubuisson and Gardeur, 2000 ; Le Bihan, 2002 ; Bontout et al. 2002): the ADL (Activities of Daily Living) scale, the Mini-Mental State Examination, the Clinical Dementia Rating, the Geriatric Index of Comorbidity (these scales all emphasise the medical dimension, that is the identification of mental or physical pathologies), the Barthel scale (which relates to daily activities such as washing, dressing etc.), the Lawton and Brody scale (which relates to the ‘ability to perform instrumental activities: telephone, shopping, medication, etc.) and the Feifer scale (used to assess cognitive capacities). However, there is also a large number of national assessment scales. Confining ourselves to France, we can mention the following: the AGGIR scale (autonomie gérontologique groupes iso-ressources), the Colvez scale, the EHPA indicator (survey of residential care homes for the elderly) and ANGELIQUE (national application providing guidance for internal quality assessments for users of establishments). Finally, there are local scales, specific to a region, a local authority or even an individual institution.

An innovation may involve the introduction of new assessment systems directed at new targets (or even a combination of several new and/or old targets). Equally, it may involve the adaptation of existing tools to new contexts, for example by simplifying them or making them more generally applicable.

Non-medical intangible technologies. Among this second group a distinction can be made, as with non-medical tangible technologies, between those whose purpose is to assist the elderly in their daily living, those used to modify the residential environment and, finally, those used to ensure that the service-providing organisation operates efficiently and effectively. The first sub-group comprises architectural innovations (spatial organisation). This is a particularly dynamic sphere for innovation. The aim is to design living spaces adapted to dependent or handicapped elderly people. Spatial (or environmental) design in residential facilities for the elderly has several objectives: 1) to encourage physical exercise, 2) to promote social exchange and 3) to encourage independence and autonomy. In some architectural schools and in some countries, it should be noted, there are courses and diplomas in ‘design for ageing’. The second sub-group comprises intangible innovations that impact on the residential environment (e.g. management of meals, cleaning protocols, etc.). The third sub-group comprises the methods used by service providers to improve their own operations and service delivery.

THE SERVICES PROVIDED

There is considerable potential for innovation linked to this target. As already noted, the categories generally used in national accounts to capture the services provided for the elderly are as follows: 1) home help services (meal preparation, shopping, housework etc.) and 2) personal and nursing (home) care services. However, virtually any existing service can be adapted to the elderly population in order to extend the range of services on offer.

In a way, such diversification of service provision can be regarded as a particularly easy form of innovation (provided that the demand is backed by purchasing power), since it is simply a question of adding peripheral services or providing access to those peripheral services. This argument is valid for all types of service provision, whether we are dealing with those provided for elderly people in their own homes or those provided in residential care homes.

Once again, it may be valuable to introduce a certain order into this open set of possible services. However, when it comes to the question of innovation, it does not seem appropriate to fix boundaries for this type of service provision aimed at the elderly. Thus we suggest that a distinction be made between the following five groups of services:

- medical and paramedical care services (nursing care, personal hygiene, etc.);
- services designed to maintain or improve the elderly person's physical, aesthetic, cultural and intellectual state (sport, hairdressing, excursions, leisure activities, libraries, etc.). These are social and cultural services that seek to combat isolation among elderly people;
- domestic services (housework, shopping, gardening, home maintenance, cooking, etc.). These services equate to the externalisation of domestic work;
- spatial mobility services (transport);
- other services adapted for elderly people.

The first four categories are the ones most frequently mentioned in the literature. However, new services aimed at the elderly may be found outside these categories. This is why it is useful to introduce a residual category.

New services are regarded here as a target for innovation in their own right. Clearly, however, these new services may fall within the scope of a particular form of service provision, just as they may depend on technological innovations.

Innovation in the services on offer may take a variety of different forms:

- the addition of new services to those already offered by a given provider;
- the improvement of a service already provided;
- the implementation of a dedicated, unique counter for a wide range of services;

- the introduction of new ‘service network’ configurations (that is, the linking of a number of different providers in various ways);
- new institutional forms of service provision (new type of service provider), etc.

THE HUMAN ENVIRONMENT (PROFESSIONAL CARERS AND RELATIVES)

As we have just seen, the targets for innovation in care services for the elderly are the elderly individuals themselves (in their various aspects) and their physical and technical environment. Another target for innovation has become increasingly important in recent years. This is the human environment of the elderly, whether that be family carers or care personnel.

After all, carers, whether lay or professional, are subject to a particularly destructive form of stress – the so-called care giver burden – that is psychological, social and financial in origin (Andrieu and Bocquet, 1999; Dutheil, 2001). This burden is the driving force behind various innovation trajectories, which have, therefore, to be identified.

Several distinctions, which will be only briefly alluded to here, can usefully be made in order to further our understanding of the nature of the innovation mechanisms associated with this burden. The first is that within the service environment between care personnel and relatives. The second is that between those relatives who provide care and those who do not. The third and final one is that between those relatives providing care who are themselves elderly and those who are not. These various distinctions may be grist to specific innovation mechanisms. Thus there are innovations targeted at each of these particular categories (for example, innovations that seek to alleviate the problem of the care giver burden).

Examination of the literature has enabled us to identify two main groups of (innovative) initiatives targeting this burden. The first seeks to assess the burden, while the second seeks to accept responsibility for it and to alleviate it.

Assessment of the Burden as a Target for Innovation

This first group of initiatives is the easiest to identify. It includes a large number of initiatives that aim to improve existing tools or to develop new tools for assessing the burden. Mention can be made, among others (cf. Table 3), of the Pines burnout scale, the Zarit Burden Inventory, or the Cope Index which are used to assess the burden on the family.

Once again, we are dealing here with intangible technologies, but this time they are directed towards a target that is not the elderly person herself but her human environment. This innovation generally takes the following forms:

- the invention of completely new measurement tools;
- the adaptation of existing tools to different patients;
- the simplification of existing tools when they are considered too unwieldy to use (e.g. the simplified Zarit scale).

Management of the Burden as a Target for Innovation

The second group of initiatives (cf. Table 3) is more complex, since it includes a heterogeneous array of arrangements for managing the ‘burden’ of the elderly person’s human environment. In order to avoid too much overlap with the innovations linked to the previous targets, we confine ourselves here to those arrangements explicitly targeted at management of this burden. In general terms, after all, the use of services, of residential care facilities and of technologies could all be regarded as strategies for reducing the burden. Despite this restriction of the field, there is still a considerable diversity of forms of innovation. Accordingly, we propose to divide the initiatives explicitly devoted to reduction or management of the burden into two groups: 1) the technologies used to reduce the burden and 2) the institutions involved in reducing the burden.

TABLE 3 : THE SPHERES OF INNOVATION LINKED TO HUMAN ENVIRONMENT
TARGET

The following are some examples of the technologies used in managing the burden: caregiver helplines, which provide families information and assistance by telephone; multimedia training, information and advice programme for carers.

The institutional or organisational innovations devoted to the burden management include, among others, the following initiatives:

- 1) the formation of support groups for family carers (family support groups): these are discussion groups that encourage exchanges of experience among caregivers;
- 2) the introduction of specific ‘training sessions’ for family caregivers;
- 3) the establishment of ‘caregiver support centres’: these are organisations providing various services to family caregivers in various spheres: respite care, support, legal advice, information, training, prevention, etc;

- 4) holiday respite facilities: arrangements that allow elderly people to go on holiday without any interruption in their care;
- 5) general respite arrangements for family caregivers at any time: temporary residential facilities set up explicitly to provide respite care.

THE INSTITUTIONAL ENVIRONMENT

Recent years have seen the emergence of many innovations in the institutional environment of care services for the elderly (particularly domiciliary support services). It is not our aim here to outline the history of public policy on care services for the elderly. Rather, we will confine ourselves to listing some institutional arrangements recently put in place in France. These arrangements can be divided into two groups (although in reality they are often closely linked), which will be merely illustrated here by means of a few examples: 1) demand-related institutional innovations and 2) supply-related institutional innovations.

Demand-Related Institutional Innovations

In France, the main recent institutional innovations in this area have sought to ensure that demand for services is backed by sufficient purchasing power. The aim here has been to facilitate the externalisation of domestic work and to reduce the volume of work in the informal economy by putting in place certain incentive mechanisms. The main such mechanisms are the so-called service cheque and the service voucher. These French experiments have received some positive feedback from the European Commission (Cabot, 1999).

Service cheques were introduced in 1995. The system allows a private individual to pay for services provided in his or her home while at the same time avoiding most of the administrative formalities normally associated with hiring an employee. These administrative formalities are transferred to a national body. During its experimental phase, service cheques could not be used to pay for more than eight hours' work per week. Since 1996, there has been no limit on the amount of hours that can be paid for.

In the same year (1996), another instrument for ensuring demand is backed by purchasing power and for simplifying administrative procedures was introduced. This was the service voucher. This instrument is based on the same principle as luncheon vouchers. The vouchers are issued by accredited companies, which sell them to works councils or, in the absence of such

councils, directly to employers. Works councils or employers then distribute them to employees, who use them to pay for domestic services delivered by approved providers.

Institutional Innovations on the Supply Side

Innovation trajectories here are driven by the desire to facilitate the emergence of a structured and professionalised supply. The construction of quality is, therefore, a key issue (Méran, 2001). It may be organised by the state or service providers themselves, as a profession. Consequently, training institutes have been set up by the FEPEM (*fédération nationale des particuliers employeurs*, or National Federation of Employers in Private Households), the major voluntary associations and the association of firms providing personal services (SESP), the foundations of France, MEDERIC (a mutual life company) and research laboratories (IPSEN, EISAI).

Furthermore, the status of approved personal service provider was established in 1992 in order to guarantee the quality of service provision, particularly in childminding in parents' homes and assistance for the elderly and handicapped. Approved status is given to non-profit-making associations operating in these areas.

In 1996 (Act of January 1996), the approval system was modified in two ways. Firstly, approved provider status, and hence the market, was opened up to private companies offering personal services. Secondly, the approval procedure was modified to make it available in two forms: i) a simple approval procedure for voluntary associations and companies that do not provide services for vulnerable people (childcare and services for the elderly) and ii) a 'high-quality' approval procedure for those providing services in these areas.

A service certification procedure is currently being put in place. Two certification or standardisation procedures currently exist for domiciliary support services, of which support services for the elderly are an essential component. The first QUALICERT saw the light of day in 1999 under the aegis of the Association of Firms Providing Personal Services (SESP), while the second is managed, under the aegis of AFNOR, by the main voluntary associations providing personal services operating under the GERIAPA umbrella.

CONCLUSION

Having long been restricted to a choice between care in the home or family and large-scale old people's homes, the market for care services to the elderly has undergone considerable upheaval. The main force driving these upheavals is the ageing of the population: the elderly are no longer a

marginal element in society but a major group within it. Contemporary developed societies can increasingly be regarded as service societies, information societies and societies of the elderly, in other words societies of the tertiary sector and of the third age.

It is hardly surprising, therefore, that the innovation problematic is occupying an increasingly important position in care services for the elderly, as it is in all economic activities that create wealth and in many ways hold the key to the future.

Like many other service activities, and perhaps even more so, given that the notions of ageing and innovation are regarded as contradictory for various reasons, care services for the elderly suffer from a negative image in terms of innovation potential. In our view, the very simple framework based on innovation targets developed here can be used to identify this innovation potential in a more comprehensive way than the traditional official indicators in the OECD's Oslo manual.

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NOTES

ⁱ We paid particular attention to the abstracts of several hundred papers given at international geriatrics conferences.

ⁱⁱ Thus the introduction of small-scale residential facilities is an innovation trajectory common to both institutions and the intermediate forms of provision.

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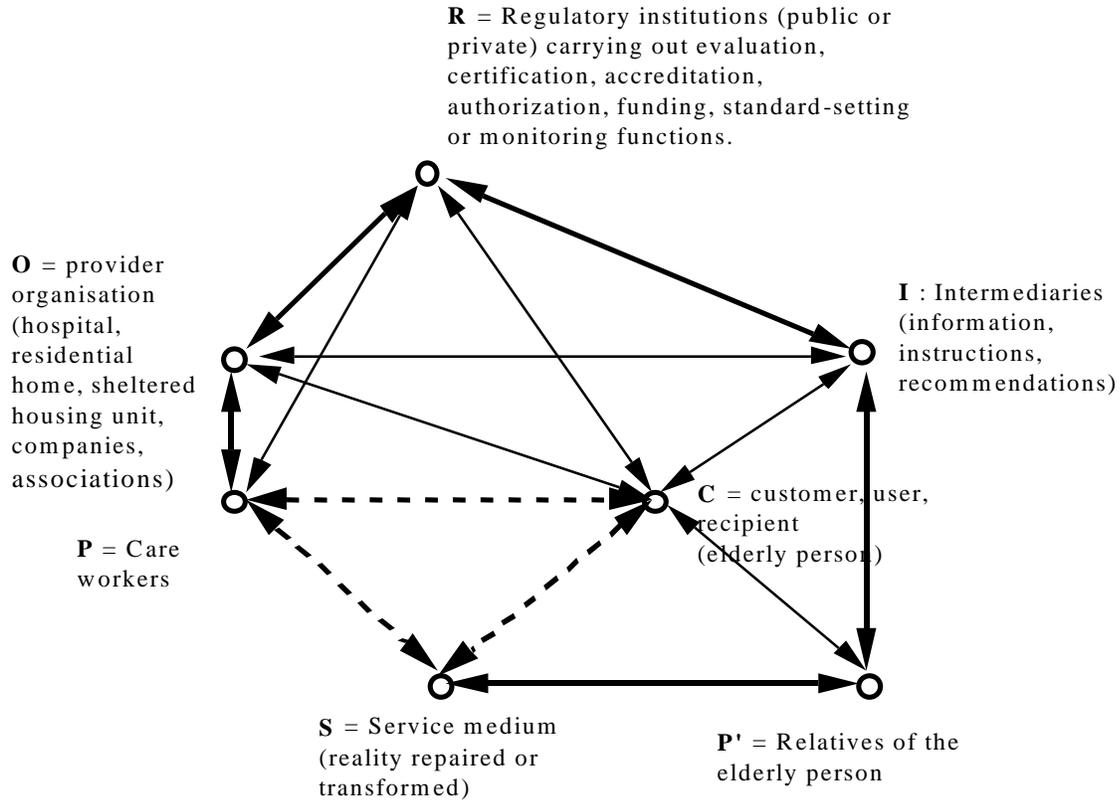


Figure 1: From the service triangle (dotted lines) to the CSE polygon (the relationships within the polygon are not exhaustive) (adapted from Gadrey, 1994)

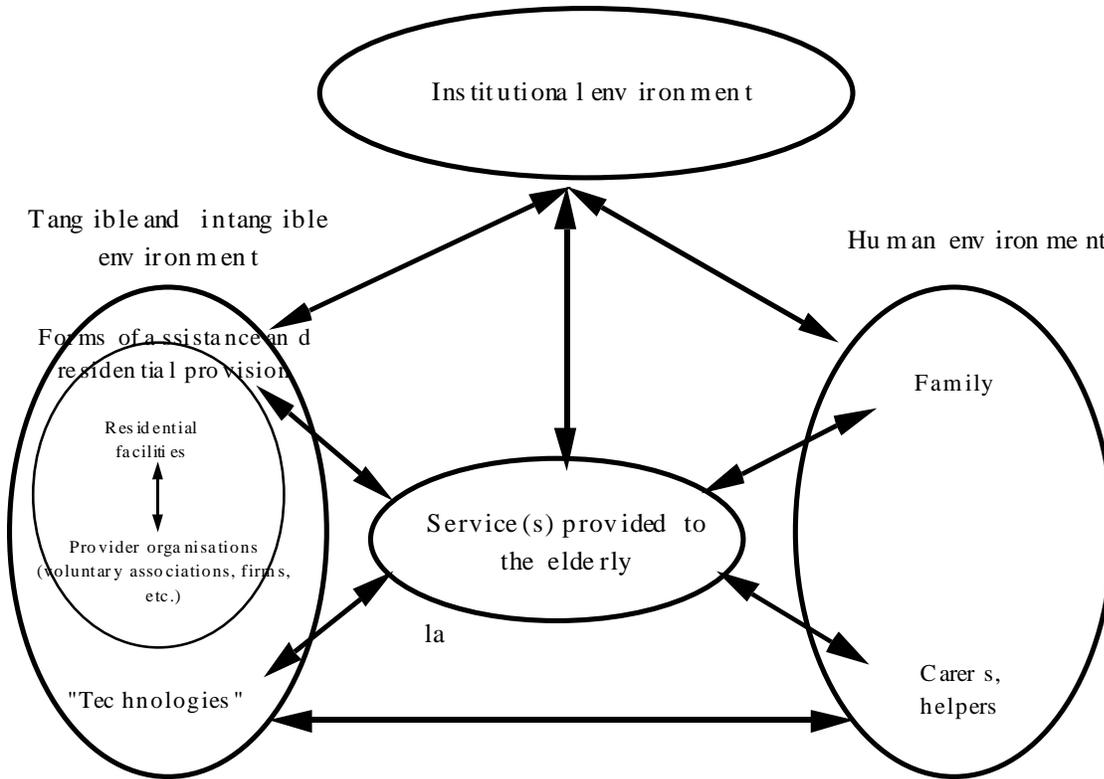


Figure 2: Targets for innovation in care services for the elderly

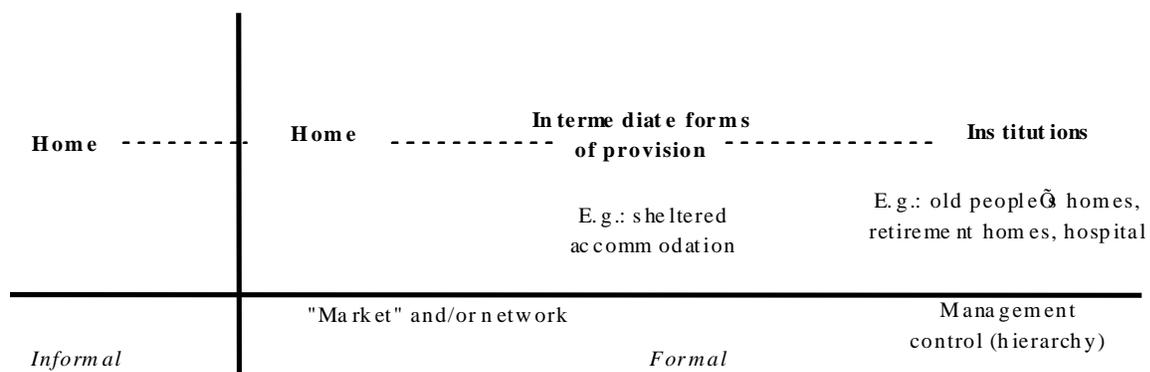


Figure 3: The general topography of the forms of assistance and residential facilities provided for elderly people

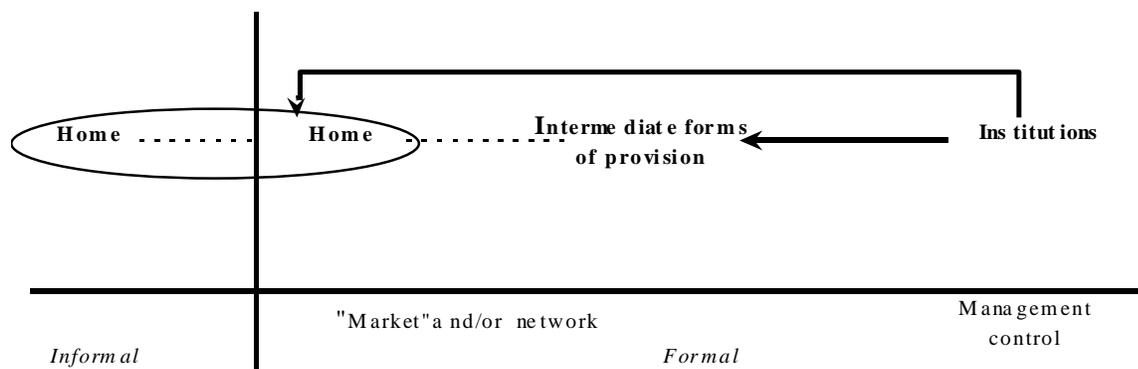


Figure 4: Horizontal innovation trajectories in the forms of assistance and residential provision for elderly people

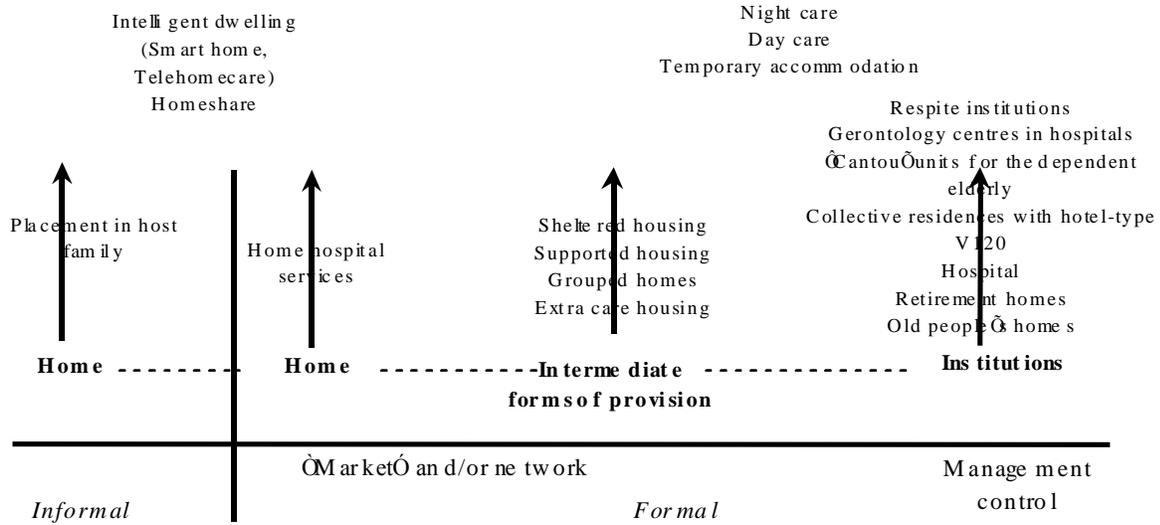


Figure 5: Vertical innovation trajectories in the forms of assistance and residential provision for the elderly (the ranking of the examples given does not reflect any organised progression in the trajectory)

	Medical	Non-medical (used to assist elderly people with everyday living, process the residential environment and 'process' service delivery)
Tangible technologies	<ul style="list-style-type: none"> - Telemedicine (for various purposes: medical advice, distance learning, podiatric procedures in retirement homes) - Remote surveillance : (e.g. : a system to detect the night-time movements of an elderly person in a hospital room) - Tele-rehabilitation : e.g.: use of technologies in the treatment of dementia, both to compensate for the handicap and to provide stimulation for patients - Various medications (biomedical or biopharmacological innovations) - Miniaturised robots in surgery - Gene therapies - Organs and replacement tissue culture 	<p><i>Technologies providing help with everyday living (domestic technologies) :</i></p> <ul style="list-style-type: none"> - Remote surveillance :alarm system in case of fall, illness, etc. - Technologies used to assist the elderly : e.g. : sophisticated electric wheelchairs, provision of wheelchairs in public places (hospitals, airports), making them as accessible as supermarket trolleys - Architectural technologies (tangible aspects): e.g.: adapted baths, toilets, kitchens - Adapted consumer and capital goods, particularly from the ergonomic perspective (user-friendliness) - Technologies for collective use : urban transport system suitable for the elderly and handicapped
		<p><i>Technologies for processing the residential environment :</i></p> <ul style="list-style-type: none"> - Management technologies for residential facilities (management information systems) - Technology for processing material within residential facilities (cleaning, catering, laundering technologies...)
		<p><i>Technologies used by service-providing organisations :</i></p> <ul style="list-style-type: none"> - Equipment for transporting meals on wheels - Adapted computer systems
Intangible technologies	<p><i>Measurement methods(gerontological assessments, diagnostic strategies):</i></p> <ul style="list-style-type: none"> - AGGIR grid - ADL (Activities of Daily Living) - Mini-Mental State - Clinical Dementia Rating - MNA (Mini Nutritional Assessment) 	<p><i>(Intangible) technologies providing help with everyday living (domestic technologies):</i></p> <ul style="list-style-type: none"> - Architectural technologies and ergonomics (intangible aspects) : e.g., internal architecture, efficient organisation of spaces - Use of colours and lights in dementia
	<p><i>Therapeutic strategies (care protocols) :</i></p> <ul style="list-style-type: none"> - Bedsore protocols - Pain prevention strategies 	<p><i>(Intangible) technologies used to process the residential environment :</i></p> <ul style="list-style-type: none"> - Management of meals (requiring particular organisation of kitchens) - Surface cleaning protocols - Laundry protocols - Waste disposal protocols
		<p><i>(Intangible) technologies deployed by service providers:</i></p> <p>General organisation of association or company, process innovations</p>

Table 1 : A typology of technological targets in care services for the elderly

	Definition	Examples
Specific technologies	Technologies designed specifically for the needs of elderly people	- Wheelchairs (not specific to the elderly) - Hip protectors
Non-specific (old) technologies	Old technologies used by the general public that have to be adapted to the handicaps of the elderly	- Telephone systems - Vending and dispensing machines of all kinds (bank notes, tickets, stamps, petrol, etc.) - Domestic audio-visual equipment (simplification of TV remote controls, video programming, etc.) - Internal adjustments to cars - Adaptation of public transport
Non-specific (new) technologies	New technologies used by the general public that have to be adapted to the handicaps of the elderly	- Internet

Table 2: Tangible technologies and the elderly

	Spheres of innovation	Examples
Assessment of the 'burden'	Measurement methods (intangible measurement technologies)	- Pines burnout scale - Cope Index - Zarit burden inventory
Management of the 'burden'	(Tangible and intangible) technologies used in managing the burden	- Multimedia training, information and advice programme for carers - Caregiver helpline
	Institutions or organisations involved in managing the burden, respite arrangements	- Mobile night nurses - Discussion groups

Table 3 : The spheres of innovat linked to human environment target