

# A Methodology for Gerontechnology Consulting as a Response to Gerontologists' Request: a case study

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**Abstract**— This article presents the methodology selected in order to advise healthcare professionals efficiently regarding their gerontechnological equipment. The advising methodology adopted is described in order to conceive the counsel for health and medical establishments as an approach centred on the needs of users. At the request of geriatricians, a case study led in 2007 has permitted to design and validate the rising interest for this methodology, applied to activity monitoring.

## I. INTRODUCTION

THE recent technological advancements in the field of healthcare make the perspective of a widespread use of gerontechnologies more realistic, should this be by the nursing staff in establishments or even at the elderly's homes. The array of solutions available has now increased, especially with the arrival on the French market of gerontechnologies such as geolocalisation, task-reminding or cognitive stimulation tools, or adapted computer, which valorise the remaining capacities of the elderly in order to preserve their autonomy as long as possible [1]. The emerging technology, understood as a tool facilitating and supporting treatment, goes along the increase of functionalities on existing systems, as it is the case for the technical management of building sites or home automation [2]. They rely on adapted technologies to improve the quality of life or of work of the elderly and of the nursing staff.

The important realization that gerontechnologies represent a real interest within the management of the elderly is a new phenomenon in France, one which goes along necessary adjustments. Once out of any normed methodological system of reference applied to medicine, and to a certain extent, out of any medical structures, there is no evaluating standard grading the pertinence of complex technologies, which would include both software and service. The training of the nursing staff remains largely incomplete, except for the few rare university degrees, which propose special tutoring in technologies.

More generally, the ignorance of trustworthy sources of information likely to provide help for the pertinent choice of adapted technology, that is to say a technology aiming to improve the daily life of patients and nursing staff alike, is a reality, which transcends the different specialities. The only technological proposition therefore often comes from manufacturers, who tend to valorise their own products, to

the detriment of the actual needs expressed by the structures.

This dysfunctional pattern potentially prevents the circulation of interesting solutions, already used by rote in countries like the USA, Japan, or Europe (Great Britain, Germany or Scandinavian countries). Conscious of the French lag in matter of technological innovation, a group of practitioners gathered on the national scale in 2007 with the purpose to test an array of particular technologies regarding the activity monitoring of patients.

## II. METHODS

### A. Frame of the project

At the origin of the experimental project are two geriatricians belonging to a group of thinking considering the integration of technologies for the elderly. Both are hospital practitioners, heads of service, even if their original structures are very different.

The first voluntary establishment is a rural local hospital emphasizing a duty of, notably for the care of the elderly and disabled. It welcomes elderly patients with different cognitive pathologies, such as Alzheimer or the like, but also patients with psychotic and mental troubles.

The other establishment is urban, situated in the centre of Paris, and specialized in elderly. It welcomes the elderly for short and long stays rather than for follow-up care or readaptation. The services are distributed as well as the medical and paramedical support necessary to the monitoring.

### B. Nature of the request

Certain that the gerontechnologies can provide a real improvement towards a more efficient management of elderly dependent patients, the group of geriatricians has led a study on the technologies of activity monitoring in 2007.

The request is not only technological. It also requires new convincing and conclusive data on the capacities, technical performances, advantages and usage constraints of these technologies in situ. The data collected must be the result of a rigorous method of analysis and of the effective use of these technologies. The information must be clear and free from any advertising pressure.

This study aims at providing accessible and practical information to those who requested it, so that the investment in a particular technology can now be led on the basis of data gathered in a report of recommendations.

### C. Methodology

The presented methodology places the needs and constraints of patients and of those helping them at the centre of the preoccupations leading to an actual choice of technology. Those are part and parcel of the thinking surrounding the implantation of innovating technologies, with a special concern to appropriation (dimension, acceptability and usage possibilities).

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Two previous experiments\* in the “counsel in gerontechnology” have enabled us to elaborate a methodology of response to the needs of health care professionals in general.

The chosen methodology rests on four successive stages: Stage1) The gerontologists express their needs, expectations and queries concerning the activity monitoring related technologies informally in semi-directed interviews.

Stage2) Precise identification of the needs for those three categories of people: doctor-gerontologists, nursing staff and patients;

Stage3) The inventory of the technologies responding to those needs, resorting regularly to a database inventorying the gerontechnologies accompanied by a complementary technological watch.

Stage4) The study of the impact of the use of these technologies on the organisation of treatment, the task planning and nature of the building work to be done for that purpose, and the recommendation of precise and adapted technological devices.

This case study has striven to provide intelligent and personalised answers to the group of gerontologists interested by the automated activity monitoring over a 10-month period in 2007. On several occasions, we visited the sites in order to meet the doctors and their teams as well as a panel of patients in institution. The coordination of the project was led by MEDIALIS, the advancement of the study was punctuated by the presentation of partial results at a given frequency.

\* Experience of “counsel in gerontechnology”: a memory workshop for patients victim of the Parkinson disease was provided; a study of gerontechnologies for a better communication between patients at home and their nearby institutions.

### III. RESULTS

#### A. Step 1: Pre-required interviews

The main points of the study were delimited by the semi-directive interview organized during our first meeting.

The first interviewed, a geriatrician, stated his inclination to set up monitoring activity equipment, especially concerning activity monitoring as much as the analysis of sleeping and iatrogenic effects on psychotics patients. At the same time, the second one, a practitioner intends to plan for a solution including monitoring the residents' activities and moves within his hospital. He particularly cared for the observation of physiological constants such as temperature, pulse and sleeping rate.

Common interests in an activity monitoring technology supervising the patient define the experiment on the one hand and the assessment on the other hand.

Performing interstructures - same technologies established in the two institutions - and intrastructures tests - different technologies within the same institution - independently of the chosen technologies was the aim of the experiment.

At first, the experiment should have put the emphasis on a scientific assessment of the technologies -e.g.: essential characteristics of a physiological setting, quality of a measurement and its restitution to the employees in charge,...- Managing considerations should have

completed this scientific analysis.

Moreover, financial constraints and the implementation of monitoring activity solution within usable hospital also were main issues of the experiment.

The aim of this step was to suggest a structural and an economic model that could be used in the futur as a reference for the institutions willing to get equipped.

#### B. Step 2: Identified needs and constraints

The second stage was divided in two: the implementation of an unique grid designed for the analysis and the formalization of the requirements in order to rate, rank and order information; the grid also helped to gather accurate information given by a group having several but linked needs: staff, patients, administrative agent and technicians.

Once classified and grouped by themes, the data gathered in the grid lead to a list (Fig. 1.) of needs and constraints.

(1)Technology include needs and constraints related to the awaited functionalities

(2)Organization include needs and constraints concerning jobs and hospital staff's use

(3)Formation deals with pedagogy revolving around the installation and its use.

(4)Administrative deals with the financial and legislative aspects

Fifteen outstanding needs have been highlighted and the questioned group associated a priority to each need - 3 level of increasing priority with + : desirable;

++ : necessary; +++ : compulsory - allowing a differential selection among the items introduced at step 3.

	Identified needs and constraints	Priority
technology	maturity of technology	+
	pulse measurement	++
	movement measurement	++
	activity monitoring	+++
	sleep measurement	+++
	temperature measurement	+
organization	weak disturbance on the service's order	++
	maintenance	++
	short duration of work of installation	+++
	integration with existing information system	++
formation	sensitizing upstream of the staff / demonstrations	+
	ergonomics of use	++
administrative	weak duration of the formation	+
	budget limited to 15000 euros per site	+++
	hardware adapted to the medicalized sector	+++

Fig. 1. Synthesis of the collection of the needs and constraints for the various users of activity monitoring

#### C. Step 3: Inventory of the technologies

This third step deals with the implementation of a matrix in which needs and constraints identified by analyzing the answers of the group are confronted to our knowledge of the items available on the market. Indeed, the MEDIALIS company has developed an expertise based on specific technologies targeting depending persons. The company also built its own database: AGEIS-Online. This database lists any technology that can be used to improve depending aged people way of living as well as to make easier the task of looking after them, either at home or in institution.

The reading of scientific papers and specialized books "gave birth" to this database. Each conducted study brings new information and enriches the database.

Monitoring activity had never been carried on before and a supplementary bibliographic research pointed out five items that suit geriatricians' needs (Fig. 2).

These five products are available on the french market.

	PRODUCT A	PRODUCT B	PRODUCT C	PRODUCT D	PRODUCT E
	wristlet + terminal	wristlet + terminal	wristlet + terminal	living place sensors	video-cameras
maturity of technology	0	0	0	0	0
pulse measurement	-	0	-	-	-
movement measurement	0	0	0	-	0
activity monitoring	0	0	0	0	0
sleep measurement	0	0	-	-	-
temperature measurement	0	0	-	-	-
weak disturbance on the service's order	0	0	0	0	0
maintenance	0	0	0	0	0
short duration of work of installation	0	0	0	0	-
integration with existing information system	-	-	-	-	0
sensitizing upstream of the staff / demonstrations	0	0	0	-	-
ergonomics of use	0	-	0	0	-
weak duration of the formation	0	0	0	0	-
budget limited to 15000 euros per site	0	0	-	0	-
hardware adapted to the medicalized sector	0	0	0	0	0
SCORE (calculated from the criteria of priority)	25	25	20	20	15

Fig. 2. Census of the technologies adapted to activity monitoring thanks to the matrix of analysis need-technologies

On a technological point of view, three categories of product can be distinguished: wristlets picking up physiological constants (3 products); environment sensor gathering up data on the depending person's living rooms (1 product); "matting" allowing the automatic detections of events.

The priority system adopted at step 3 associate each technology with a certain number of points, knowing that a desirable level is equal to 1 point, a necessary level is equal to 2 points and a compulsory level is equal to 3 points.

#### A. Step 4: Recommendations and study of the implementation of the technologies

According to two physicians' request, the two technologies that mostly met physicians' technical, organizational, administrative and training needs have been chosen within our recommendation. These two technologies, 25 points each, have been tested and confronted to the criteria settled by the geriatricians.

A suggestion concerning the setting-up of a technology in each hospital has been edited according to each one's (c.f. Step 1) preferences.

The geriatricians received the recommendation report on December 2007. They acknowledge the accuracy of the data gathered up during the interview stage as long as it perfectly sums up the needs and the constraints they meet. They received a comparative statement of the technologies breaking down the information (Fig 3). Conclusive data concerning the obstacles linked to the installation and the use of the technologies can not be appear in this article because of their commercial pattern of the study.

Both institutions currently test out the technologies as part of an inter-structure assessment - one type of product per institution - in order to estimate the advantages and the difficulties encountered during the installation of these gerontechnologies. Practitioners decided to establish parallels between their results and thus confirmed that these technologies contribute to the improvement of hospital staff's labor as part of the monitoring activity.

## IV. DISCUSSION

The methodological approach proposed in this experimentation enabled us to recommend technologies

adapted to the needs expressed by the different actors working towards the improvement of the elderly's quality of life. It now remains to validate those intermediary results by adapting the same approach to other health care structures such as those existing in France. This comprehends the "Etablissements d'Accueil pour Personnes Agées dépendants" – i.e. French for Establishments for the Lodging of Dependent Elderly People, as well as Specialised Houses. What is more, a complementary case study is being led in order for this type of approach to become systematic and to complete it by precisising the general state of the elderly patient and the technical constraints of installation of the tested technologies (for example: profile of competent fitters, level of technicity etc)

The circulation of the results of this pilot project also participates to the effort of sharing data and knowledge gained so far, an effort which has been pursued now for several months at the initiative of referential institutions in the field of health care, such as the FNCICAT or CNSA – i.e. French State Fund for Solidarity and

		A	B
ACQUIRING	Cutaneous temperature	o	o
	Temperature	-	o
	Pulse	o	-
	Movement	o	o
	Micro-movement	-	o
	Sudation	-	o
WATCHING	Cutaneous temperature	o	-
	Temperature	-	-
	Pulse	o	-
	Movement	-	-
	Micro-movement	-	-
	Sudation	-	-
	Activity	o	o
	Circadian rate	-	o
	Faintness	-	o
Fall	o	-	
ADDITIONAL FUNCTIONS	Running away	OPTION	o
	Manuel emergency call	o	o
	Nurse call	-	o
	Phone nurse call	OPTION	-
	Protection of the isolated worker	-	o

Fig. 3. Comparison of two technologies of activity monitoring selected in response at the gerontechnologists' request

Autonomy. The latter, anxious to make up for the lack of information available for nursing professionals, is supervising the federation of different database on technological aids, doing so along the laudable effort to provide reliable and independent information, free from any type of pressure. The insertion of evaluated gerontechnologies in institution could thus constitute an addition to the initial experimentation that would favour the opening of the metabase to innovation, given the high degree of complexity at work in gerontechnologies.

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We wish the best continuation to the project for the study of activity monitoring in both establishments.

#### REFERENCES

- [1] Rialle V, Ollivet C, Guigui C, Hervé C. What Do Family Caregivers of Alzheimer's Disease Patients Desire in Smart Home Technologies ? Contrasted results of a wide survey. *Methods of Information in Medicine* 2008;47(1).
- [2] Rialle V, Duchêne F, Noury N, Bajolle L, Demongeot J. Health 'smart' home: Information technology for patients at home. *Telemedicine Journal and E-Health* 2002;8(4):395-409.