Deliverable **2.4**	
"Digital Learning Model with Elderly"	
Lead Partner:	CIID
Authors:	Alessandra Millevolte, Massimo Mustica – Laboratorio delle Idee srl
Contributors:	
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TABLE OF CONTENT

INTRODUCTION

This document is aimed to describe the integrated learning model, which is an object of deliverable n. D2.4 of the Helicopter project. The model is the result of an analysis of strategies and learning techniques used in the field of training activities for adults and especially for the elderly; a particular subset of the target is that described through the field research carried out by CIID partners within the WP2 of the project.

Therefore the document intends to describe:

- the context within which the design of the model is developed (the AAL Ambient Assisted Living),

- the characteristics of the target to which it is addressed,

- the requirements of theoretical bases,

- the learning strategies to be applied,

- the relevant content to the project,

- the characteristics of learning environments,

- the selected methods of assessing the effectiveness of learning.

It is important to note that the learning model we designed is not the best possible one[1] but rather a model concretely adoptable, as adapted to the context of reference AAL and sustainable in both technical and economic terms. It therefore represents a concrete reference for products and services related to the aged people learning.

For this reason, the main features of the model, as the inspiring guidelines, are designed to be adaptable and reproducible even in scenarios different[2] from that proposed by Helicopter project, provided they're always related to the broad category of AAL.

Our model takes into account the fact that at the moment the segment of the population affected by the projects of AAL is not represented by digital natives: they are protagonists of a digital divide still expected to continue for at least a decade, ensuring a lasting applicability of the model.

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[1] The best model possible, if it exists, would require, among other things the possibility of providing training sessions in presence, especially at the beginning of the path, and then one to one sessions, in order to maximize the customization of the learning: not feasible conditions, for economic reasons even before organizational.

[2] Different scenarios -in terms of the technological environment and involved stakeholders – imply different characteristics, content and learning objectives

BACKGROUND OF THE PROJECT AND ITS CHARACTERISTICS

Helicopter project is part of the vast domain of the Ambient Assisted Living (AAL), a term coined in the early twenty-first century to describe a set of technological solutions aimed at making the environment in which we live "smart" and cooperative, effective in supporting a independent living and in providing greater security, simplicity, comfort and satisfaction in the performance of daily activities. Protagonists of projects AAL are older people, not necessarily ill but basically fragile, which are having to interact with technologies - mostly available in the home - that acquire information on the environment and people; the learning model fits into this scene as a factor able to interact and integrate these elements.

In brief, the purposes of the AAL systems are:

● To extend the period in which people can live in their usual environment, increasing their autonomy, self-sufficiency and mobility;

● Helping to maintain health and functional capacity of older people;

● To promote healthy lifestyles for people at risk;

● To increase safety, prevent social exclusion and maintain the network of relationships of people;

● Supporting workers, family members and organizations of the assistance;

● To improve the efficiency and productivity of resources, from the perspective of an aging society.

The issues of active aging and AAL activities are the focus of numerous research programs and measures provided by Horizon 2020, and of course the AAL calls for projects (www.aal-europe.eu): the call referenced in the Helicopter project, the n. 5 - "ICT-based solutions for (self) management of daily life activities of older adults at home" - was specifically addressed to research proposals aiming at developing innovative ICT-based solutions with the potential to enable and sustain management of daily life activities of older adults by giving support in relation to:

1. Enabling older adults to sustain and continue managing daily life activities in their home. This includes ICT-based solutions which are used by the older adults, as well as solutions which require support by others;
2. Supporting informal carers to give assistance.

Of course the objectives of AAL - and consequently those of the call to which the project Helicopter responded – cannot be obtained only through the development and implementation of new technologies, but require synergistic actions of communication between all the stakeholders in the process (researchers,

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designers , industry, users, administrators, social and health care workers, etc.), as well as new approaches to "traditional" activities, and consequently a literacy and training of citizens and stakeholders in the correct and effective use of the systems of AAL.

In brief, the system collects data on the health and life of the users (aged people) through various sources, analyzes and "returns" them, together with related and significant inputs for the correction of erroneous behavior or the implementation of a healthy lifestyle, oriented to maintain autonomy, within a system of records, information, feedback and communicative interactions between the actors of the system (the users, caregivers, doctors, the community of reference).

RATIONALE OF THE LEARNING MODEL

The need to think about a specific learning model for the elderly in the context of AAL systems from the recognition of factors characterizing this domain, referring to:

● the type of target and its characteristics, in terms of learning needs and motivation, as well as of lack of habit to educational contexts (both traditional and functionally dependent on the new information technologies); in this respect it 's necessary to remember that the greatest obstacle to older people in undertaking a learning/training process is the decay of brain function, resulting in weakening of concentration, memory and mental flexibility. Contrary to the past, in which the brain aging and its consequences were considered inevitable, today the progress of neuroscience demonstrates that the brain is plastic in all ages and intellectual aging may be reversible: a primary function in this effect have learning experiences that allow a restructuring of the brain maps and improved mental function. Learning changes the brain: the elderly person can recover most of his mental capacity due to cognitive and motor activities specifically designed to stimulate the cortical neuroplastic restructuring[3];

● the learning environment, which in this case is his/her home, where the user tends to be alone, in a context that is familiar and comfortable, but at the same time "abnormal" with respect to the activity of learning, where actions and objects must be rethought and reinterpreted in the light of the function that can play for learning in AAL;

● the total autonomy in which the learning activity takes place, which requires the "prevention" of the difficulties people may face and the foresight of support tools they may require;

● AAL environments provide information and functions to be communicated to the elderly and their caregivers, who are not digital natives and have problems regarding the use of the instrument; therefore we've to wonder about how to communicate with them and how to present learning contents as healthy lifestyles: this training – that is part of long life learning - is currently ignored because it is not addressed by training organizations;

●sSpecial conditions of people, heterogeneous environments and contents;

● need to control the part of informal training for both the elderly and the caregivers.

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[3] Neuroscientist Michael Merzenich (1942 -) is a professor emeritus neuroscientist at the University of California, San Francisco. Thanks to his studies, he came to the conclusion that a specific program of activities able to stimulate new neural connections and to reorganize cortical maps, can ensure that learning become effective and rewarding even in old age. The meeting between the research done in neuroscience on the plasticity of the brain and research in the field of adult education could offer a significant contribution to the development of new methods and strategies of teaching and learning for the promotion of Lifelong Learning

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The latter is particularly important, because of the natural extension that the concept of lifelong learning[4] is having in the direction of life wide learning (i.e. learning and training that encompass all aspects of life):as a matter of fact, life wide learning stresses the concept assumed that training can take place in all areas, and at any stage of life.

Within the life-wide learning approach, learning and personal development are seen as a whole of life enterprise. Life-wide learning adds important detail to the broad pattern of human development called lifelong learning: that is all the learning and development we gain as we progress along the pathway of our life.

Lifewide learning recognizes that most people, no matter their age or circumstances, simultaneously inhabit a number of different spaces - like work or education, family, clubs or societies, traveling and holidays activities, etc. So the timeframes of lifelong learning and the spaces of life-wide learning will characteristically intermingle and who we are and who we are becoming are the consequences of this intermingling.

Therefore learning and training processes are typical not only of the whole of life, but also of all the contexts of life - not just traditional ones responsible for education and training in formal and non-formal contexts, but also those taking place in a completely informal way, without the consciousness to be carrying out a learning or training process -. Hence to keep track of those learning acquirements informally got becomes important in the enhancement of the activities carried out by caregivers (especially the formal ones), and in the enrichment of their professional portfolio of skills.

Summarizing, the reasons why it is necessary to design a specific learning model for AAL environment are the following:

• technologies and AAL solutions allow you to extend the user profile with new information and therefore the possible levels of learning and training customization;

• a model is a tool to create learning/training solution that are usable, economic and therefore marketable;

• in this sector market is in the growth phase;

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[4] The term "lifelong learning" means the education during the whole of life, from life to death: that education begins even before school and continues until after retirement. Lifelong learning is presented as a unified and unifying element, which changes the perspective of the individual training as well as that of the society, although it is strongly aimed especially at work, both in terms of knowledge necessary to fill certain positions, that in terms of new jobs . The extraordinary revolution implemented by lifelong learning has the consequence of the contamination between the knowledge acquired through training and experience and those resulting from daily life, that is Experiential Learning.

•learning/training in AAL environment (that is part of Long Life Learning) has unknown features that should be hypothesized and investigated;

• the richness and the potential of technology does not find a match with people's ability to use them, in order to achieve the objectives of safety, wellness and healthy lifestyles.
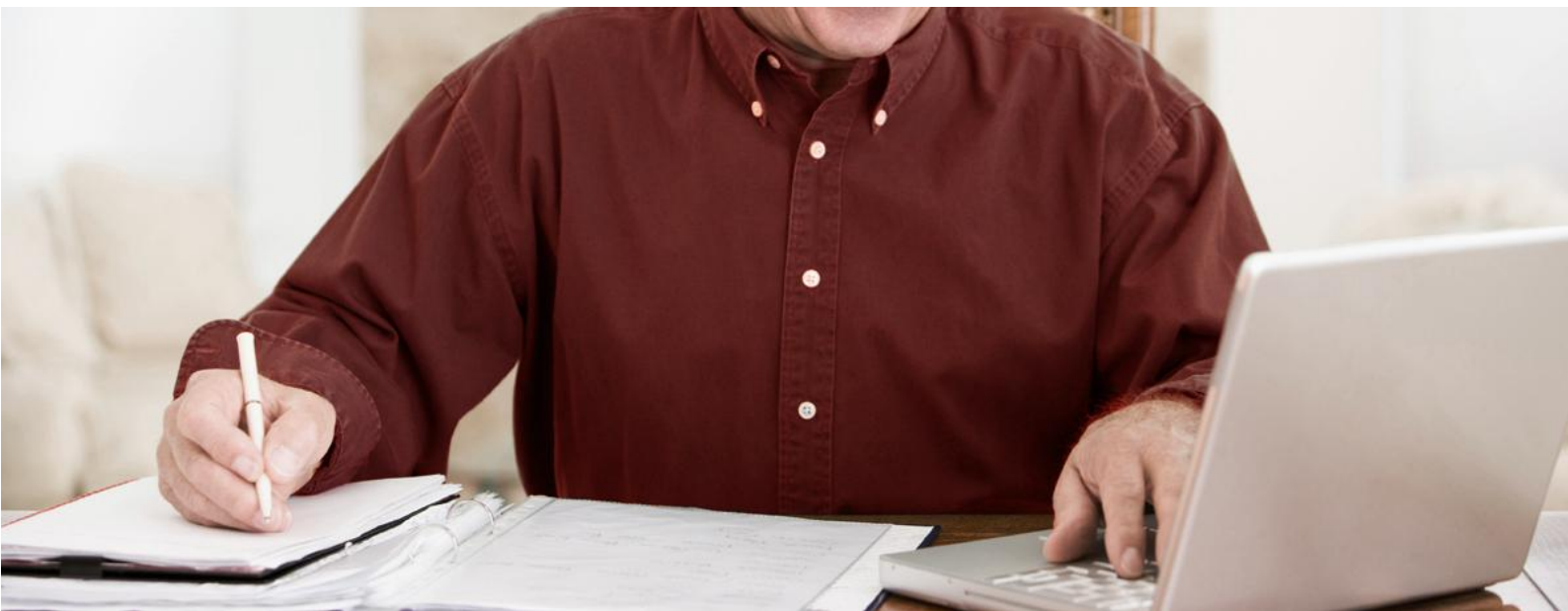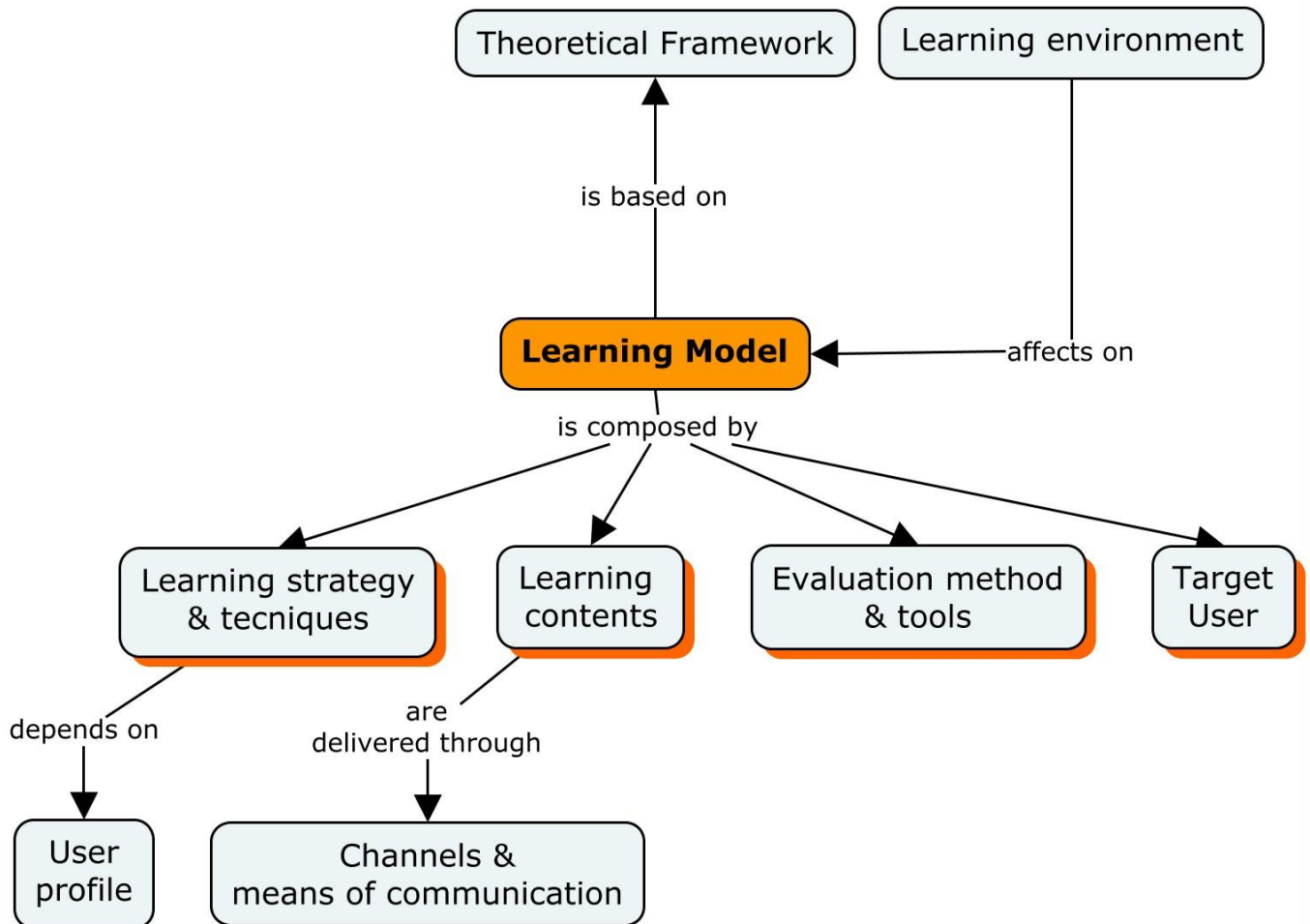
WHAT IS A LEARNING MODEL

In consideration of both cultural and institutional differences between the countries involved in the project, it is useful to focus on what it is generally meant for learning model, in order to get a shared notion. According to the sectors and users, the term "pattern" has several meanings. Generally it refers to a mental model that contributes to the understanding of something that we are not able to directly observe or experiencing; as part of the Science of Education, the model is a set of guidelines for the design and implementation of a systematic learning process, the conceptual and schematic representation of a process in which the elements and phases are showed as well as the relationships between them. The model is functional to the identification of procedures for the production of learning paths; among its main aspects the reproducibility and the adaptability to different contexts of use are the most relevant. In the Instructional Design area, models have therefore general specifications, within which teaching strategies, methodologies and technical skills can take place as well as the learners activities and behaviors that from time to time are considered functional to a given context. Therefore each learning environment always corresponds to a specific declination/application of the learning model.

Briefly, the meaning we give to a learning model within the Helicopter project is that of a conceptual framework within which you define the constituent elements and their connotation in this case, taking into account the special characteristics and needs of the target audience. This conceptual scheme – typical of any learning environment - has the property of adaptability to different learning contexts and therefore represents an operational cross-grid, to be filled from time to time with different contents, depending on the target and the educational objectives of reference.

- Essentially a learning model can be represented by:
  - Objectives (in relation to the target audience)
  - Learning/training methods and their theoretical reference
  - Channels and means of content delivery
  - Contents subjects
  - Way of verification of the results

**Learning Model
conceptual map**

Theoretical Framework

Learning environment

is based on

Learning Model

affects on

is composed by

Learning strategy
& tecniques

Learning
contents

Evaluation method
& tools

Target
User

depends on

are
delivered through

User
profile

Channels &
means of communication

HOW TO CONSTRUCT A MODEL

A model should include the profiling of technologies (device profile, in terms of communication channels), as well as the user profile (in terms of learning styles) and the profiling of those environmental information that are relevant to all the phenomena concerning learning.

Since the model is a schematization, it should indicate an ambit where developers of learning solutions can move to make and test specific solutions.

Of course the model should have a certain level of adaptability, as well as the solutions based on the same model; in order to define which is the right level of adaptability, we've to take in mind that it is a function of the investment costs and the market features.

The learning model is built as a working hypothesis, starting from the available data relating to the targets of aged people and their caregivers, and should be validated by involving a representative sample of the target audience. The implementation of the model, by education experts, instructional designers and designers of multimedia solutions, specifically takes into account the context of use of the training contents: in our case a domestic context (generally providing information about environment and learning people), in which the main user – the aged person - can be embodied by very different types regarding the level of awareness, the level of familiarity with the tools, the literacy and cultural level, the motivation and approach to life, the perceived social role, the social life dimension and quality, etc.

Of course the level of computer literacy is different in different national contexts of the partner countries, but just in order to spread and possibly enhance the model at the European level, it seems correct to adopt basic standard values. We must remember that the target population of the AAL projects is currently characterized as very unfamiliar with computer support and generally with the world of ICT: the digital divide with respect to the new younger generation probably will remain for a few more decades, before the first generation of digital natives become part of the target of "over 65".

HYPOTHESIS OF APPLICATION OF THE LEARNING MODEL IN AAL
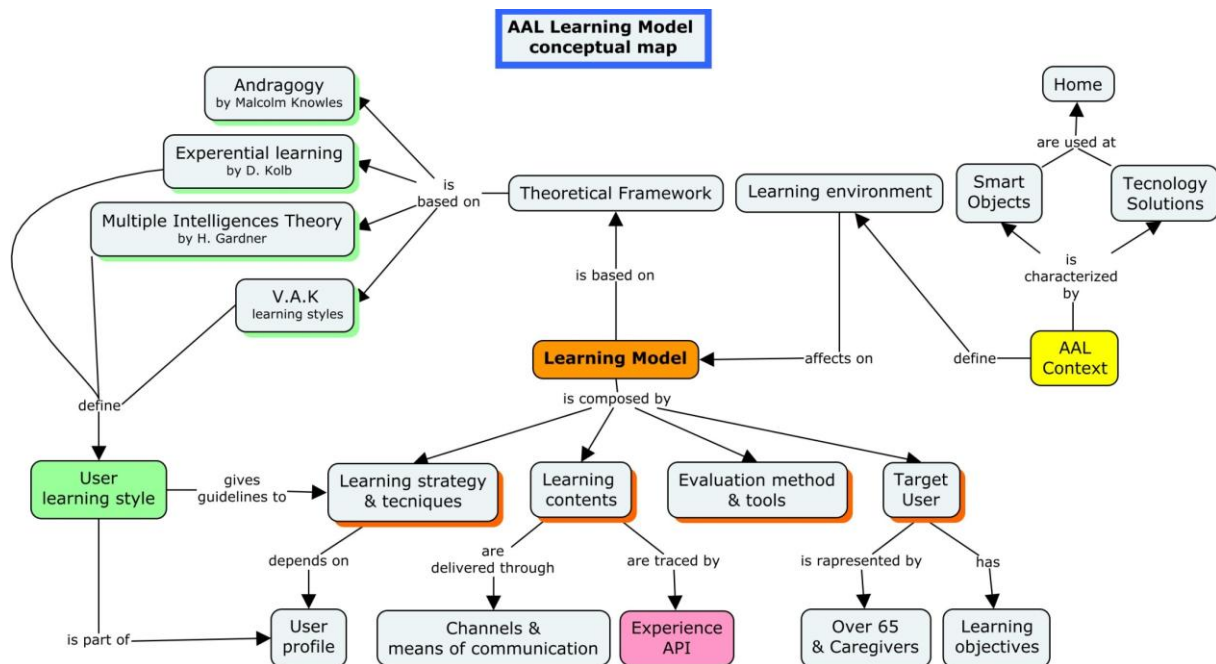
AAL projects are aimed at delivering a motivational and disease prevention support

to older adults, therefore the learning model is aimed to increase and monitor the knowledge of the elderly users, the awareness of the consequences of wrong habits and their capacity to change for the better their lifestyle. The grid elements that address the operational realization of the learning model in the field of AAL can be represented as follows:

Targets and their features

Theoretical framework

Learning contents

Learning environments

Learning and teaching strategies and techniques

Evaluation

Targets and their features

The targets of the learning model is that of:

● elderly people (over 65), according to the call's purpose, that are still autonomous and living at home, but have to be supported in order to let them continue to manage their life and carry on the daily activities;

● caregivers (for the purpose of our model, mainly informal caregivers).

A previous profiling of each member of the target group (mainly elderly people) is required, to collect information about:

- Educational level

- Computer literacy level

- Learning styles (in order to optimize learning processes and results)

- Preferred communication channel (VAK)

- Users interface devices' feature: this kind of information is relevant, as in an AAL complex environment many devices could be available to deliver information, data and learning contents; therefore their features have to be taken into serious account in designing the model application and the learning contents proposal.

The user profiling is very relevant, in order to customize learning contents and their way of delivery. As a matter of fact, the concept of a learning model inside the frame of AAL could provide and support the aged people with data and information that are selected and presented by the system according to:

- daily health conditions

- data collected by sensors

- profiling data

- type of environment

- learning styles

- available tools

- user behavior toward the system,

- user mood (if detectable based on some physical indicators of emotional level and/or feeling or comfort/discomfort such as blood pressure, etc.)

For instance, it should be possible to adapt the presentation of information and contents to the aged people, according to their daily mood, by using suitable background colors or appropriate greetings messages, etc. On the other hand, the daily health conditions can provide information about which learning contents are more useful to be proposed by the system (e.g.: if an increasing of the weight has been

detected, the system could support the user with a "training pill" about benefits from a healthy eating habits).

Theoretical framework

From the point of view of the theories and paradigms of educational reference, the model is essentially based on the andragogy by M.Knowles, as well as the assumption of H. Gardner's Multiple Intelligence Theory, D.Kolb's experiential learning and V.A.K. communication and learning styles[5].

Andragogy[6] represents the conceptual ground, as it is a recognized and widely shared approach to adults learning and training. At the same time, the Multiple Intelligence Theory[7] is a necessary reference, if you

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[5] Learning styles are unanimously defined as the favorite or prevailing techniques of brain function when you are faced with the acquisition of new information. More generally, thanks to experiments conducted by psychologists and scholars of learning, we know that each individual tends to acquire and manage the differently information. To give some examples, some students are at ease with data and factual information, while others handle theories and abstract models with impressive ease. Some others incorporate data more easily when submitted by a visual support (pictures, charts, diagrams), while others prefer the oral explanations.
Most of the models used for the description of the learning styles include the use of multiple-choice questionnaires. The survey questions can be specific to the activity of the study (with questions about timing, instruments and preferred modes) or more generally to everyday situations. The result of the test is still subjected to the student, who must say if he recognizes himself or not in this result. Another frequently used technique is that of interviews, asking students to express and carefully describe their approach to the study, their difficulties and strategies used from time to time.

[6] Andragogy is a term coined in contrast to that of pedagogy: it is a theory of learning and of adult education that has Malcolm Knowles as its greatest exponent. It is a model centered on understanding the diversity of needs and interests of adult learning than children. Essentially, in structuring a training for adults, you need to keep in mind certain fundamental assumptions (core principles):
a. The need to know: adults feel the need to know why they need to learn something and how it will be useful for them.
b. The concept of self: while the child has a self-concept that depends on others, the concept of self in adults is a substantially autonomous dimension.
c. The role of prior experience: experience has a key role in adult education, understood both as prior learning, both as mental habits and prejudices that can hinder new acquisitions. Any group of adults is much more diverse - in terms of background, learning style, motivation, needs, interests and goals - than a group of young people. Therefore in adult education experiential techniques - that address and enhance the experience of learners (group discussions, simulations, problem solving, case method and laboratory methods) - must be used preferentially than the traditional lecture using transmission techniques.
d. Willingness to learn: in adults the willingness to learn is related to what it is useful to know and to know-how in order to effectively tackle real-life situations.
e. The orientation towards learning: adults are motivated to commit themselves insofar they think it will help them in performing tasks or problems faced in everyday life.
f. Reason: adults are motivated by a desire to improve job satisfaction, self-esteem, quality of life.
These assumptions imply a new way of designing and implementing programs of adult education, as well as a different role for the teacher.
Knowles proposes the direct involvement of adult learners, assigning them a role in decision-making at all stages of the process, starting with the definition of the objectives. The experience, but also the emotional and affective state of individuals, their mutual interactions, and those with the context of life (both professional and personal) are considered learning resources.

[7] The American psychologist Howard Gardner (1943 -) is considered the main representative of the Multiple Intelligences Theory: this theory is opposed to the classical intelligence, based on the assumption of a unitary factor, measureable by IQ and states that human beings have a variable number of mental faculties relatively independent of each other: Gardner identifies at least seven:
1. Logical-mathematical intelligence is manifested in the comparison and evaluation of concrete or abstract objects, as well as identifying relationships and principles.

want to give value to diversity in learning ways and to the differences inside users profiling. As for Kolb's experiential learning[8], it provides useful information about mental attitudes of people, very important to

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2. Linguistic Intelligence is expressed in the use of relevant language and words, and in the ability to adapt from time to time the known terms to the nature of the task.

3. Spatial intelligence perceives and represents visual objects, manipulating them ideally, even in their absence.

4. Musical intelligence is revealed in the composition and analysis of music, as well as in the ability to discriminate accurately height of sounds, timbres and rhythms.

5. Kinesthetic Intelligence is revealed in the control and coordination of body movements and manipulation of objects in functional or expressive purposes.

6. Interpersonal Intelligence is evident in interpreting the emotions, motives and moods of others.

7. Intrapersonal Intelligence supports the understanding of our own emotions and the ability to channel them into socially acceptable forms.

The Multiple Intelligences Theory means that the different types of intelligence are present in all human beings: the spread of their intellectual properties and performance in each individual must be sought only in the respective combinations.

[8] David Kolb (1939 -), American educator, researcher and scholar of the learning process, has the authorship of the concept of experiential learning: a process in which the construction of knowledge occurs through the observation and transformation of the experience, not through passive acquisition of knowledge, concepts, relationships. The learning process takes place through four phases:

     a)   stage of concrete experiences = learning derived mainly from perceptions and reactions to experiences (discussions, lectures, events, problems)

     b)   stage of reflective observation = learning comes primarily from listening and observation (reflection on experiences from multiple perspectives)

     c)   stage of abstract conceptualization = learning takes the form of thought and analysis of the problems in a systematic manner (creating concepts)

     d)   stage of the trial = active learning comes mainly from acting, from experience (observation of the results).

These four steps define a learning process effective and comprehensive, which can start at any point in the cycle; each stage requires different abilities to be managed in the best way. The predilection for some of these stages creates different learning styles, which emerge from the intersection of two axes: the first refers to the preference for reflective observation (watching) or active experimentation (do); the second to the preference for the concrete experience (feel) or abstract conceptualization (thinking). Four learning styles derive from the combination of the two axes:

Adaptive style, which focuses on the concrete experience and active experimentation, prefers the facts to the words, working to targets. It is the style preferred by those who have to respond quickly and show flexibility and willingness to change, motivated by an interest in the achievement of results. They actively participate in learning and should be encouraged to explore independently, to develop intuition and creativity.

Divergent style, which favors reflective observation and practical experience. It pays great attention to the imagination and emotionality. It tends to generate a lot of ideas, but is less interested in their realization. It gives priority to the overall view and the systemic approach, the multiplicity of interests and relationship focus. It likes to find connections between learning and personal experience.

Converging style, which focuses on the abstract conceptualization and active experimentation. It analyzes the ideas according to the cost-benefit analysis, assessing the consequences in a deductive way. It learns by trial and error, prefers an environment where the error is not sanctioned.

Assimilator style, which favors reflective observation and abstract conceptualization, collection and analysis of data, the abstraction and conceptualization. It's less concerned with relationships and practicalities. Logic and organization define its communication style.

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understand which is the most efficient and powerful learning process to stimulate: for instance a very simple application is that the same verbal content could be presented in a more synthetic or analytic and well defined way, according to a "divergent" or "assimilative" learning style. Last, but not least, the preferred communication channel described as V.A.K (Visual, Auditory, Kinesthetic)[9] provides information
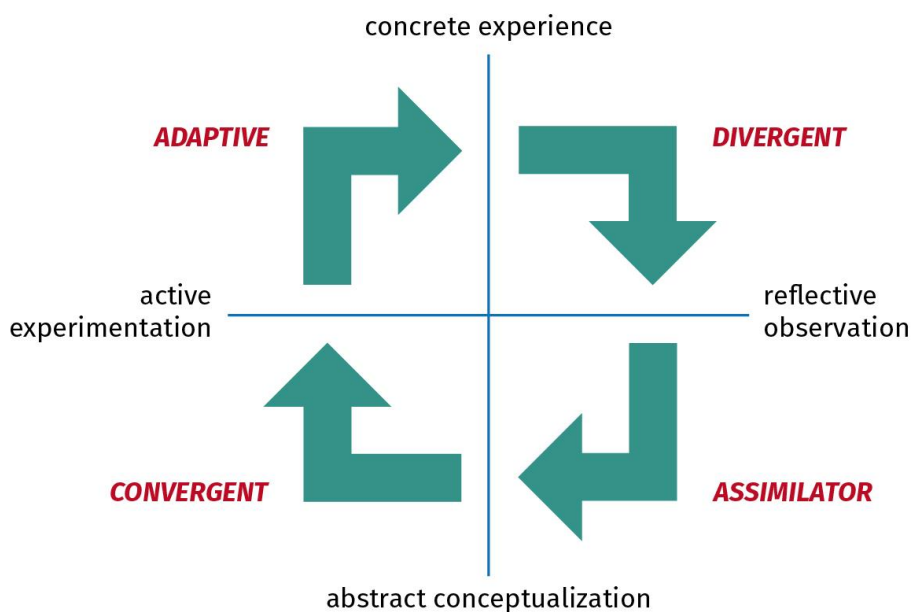
Each learning style presents benefits and disadvantages, so the greater the variety of styles that a subject is able to adopt, the greater is its ability to learn in different situations and environments.

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[9] VAK (acronym for: Visual, Auditory, Kinesthetic) is a model for understanding the learning style (i.e.i. acquisition and processing of new information) privileged by each person. According to this model, many people have a dominant style of learning, others have a more or less balanced mix of three styles: Visual, Auditory, Kinaesthetic.

Visual learners tend to:
Learn through seeing
Think in pictures and need to create vivid mental images to memorize
Enjoy looking at maps, charts, pictures, videos and movies
Have good visual skills so they're able in puzzle building, reading, writing, understanding charts and graphs, painting, designing practical objects, etc.
To help visual learners, the learning contents should: use graphs, charts, diagrams, illustrations and any other visual aids; include concept maps, outlines, handouts, etc. for reading and taking notes, as well as flip charts and supplementary textual information with picture whenever possible.

Auditory learners tend to:
Learn through listening, disussing and talking
Have highly developed auditory skills so that they're generally good at speaking and presenting, storytelling, explaining, teaching, understanding the syntax and meaning of words, remembering verbal information
Think in words rather than pictures
In order to help auditory learners, it's better to begin the presentation of a new subject with a registered brief explanation and/or a summary at the end of the presentation, as well as to include auditory activities, have the learners verbalize the questions, develop an internal dialogue between learners and the computer system.

Kinaesthetic learners tend to:
- Learn through moving, doing and touching
- Express themselves through movement, so that they find it hard to sit still for long periods

about how to design a learning content in order to better stimulate and impress the learner: for example images as well as "visual" words[10] are preferable to be used for a Visual person, while sounds are more easily understandable and storable for an Auditory.

Learning Contents

Contents to be learnt are related to healthy life styles and are defined on the basis of the abnormal situation reported by Helicopter system. Contents should also be customised to the targets, mainly on the basis of the providee's profile, according to the learning objectives:

- literacy to the use of the system and the smart objects present at home and the correct interpretation of the data supplied by them;
- modification of the habitual behavior toward the acquisition of more healthful lifestyles, in order to manage one's own life in an autonomous way.

Learning environment

The learning environment is defined on one side by the AAL environment management system software; on the other by the familiar context of their home and its instruments that, in addition to the tablet, can be connected to the system (TV, smartphone, display appliances, etc.) and can be used synergistically to achieve the defined learning objectives; the user has mastered the use of these tools, they are placed in the home, therefore they can play a reassuring aspect, while also increasing their potential for use.

As for the channels and tools to be chosen, we've to consider that technology is an obstacle in itself, especially for the target aged over 65, and in some partner countries: therefore the model should provide an organization with three levels of complexity, each of them related to different media:

a. basic level, intended primarily for those who are not familiar with the new technologies, which are still used to watch TV (also using a simple remote control) and listen to the radio: radio and

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- Have good sense of balance and eye-hand coordination
- Remember and process information through interacting with the space around them
- Have skills in physical coordination, athletic ability, hands on experimentation, using body language, crafts, acting, miming, etc.

To help kinaesthetic people in learning, it's better to use activities that get the learners up and moving, play music, whenever possible, during activities, use colored markers to emphasize key points, guide learners through a visualization of complex tasks, let them transfer information from the text to another medium such as a keyboard or a tablet.

[10] Visual words are those referred to visual actions, object or adverb: e.g. "I want **to see** the situation **clearly**", "Give me an **overview** of the problem", etc.

television will be then used as a medium to convey the provision of information and learning content;

b. intermediate level, geared to those who have at least a basic computer literacy, which allows them to use the basic functions of the computer, and have tools such as PC or tablet, the use of which may possibly be accompanied / supported by a facilitator (family member or caregiver);

c. advanced level, which requires users able to be autonomous in the use of computer media (such as PCs, tablets and smartphones), addressed to train users to use them with the purpose of sharing and socializing (e.g.: use of social networks) .

Each of the three levels corresponds to different media and contents that can be added up and increased, complementary and integrated. Users will have access to the level that is most appropriate, based on their own needs and interests.[11]

Learning/teaching strategies and techniques

Considering the age of the target audience and the acquisition of well-established mindset and cognitive habits, as well as the fact that the training process is in the form of self-training, users cannot adjust to the dynamics of a top-down teaching proposal. Therefore it is appropriate that the learning contents are offered in forms and methods consistent and congruent with the cognitive, learning and communication styles presented by users. The same content may therefore be proposed in various modes (in language and communication channels), in order to be better understood and treasured by the user. In this sense, the model requires a user profile from the perspective of cognitive style and the preferred communication channel, in relation to which the learning content can be otherwise declined.

The learning strategies adopted in the model are consequently those defined by the tools and the skills managed by our targets.

As for the elderly people, we'll design interactions with the learning contents based on well known typologies, such as those with TV set, videorecorder, magazines.

The contents rendering and their sequencing will be designed according to the users' profiling data. The same content should be consequently produced in different ways. The contents will be structured in

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[11] Of course, in the specific context of the Helicopter pilot, the model will be applied taking into account that participants have to use the tablet and the Wireframe interface (that in the model corresponds to the intermediate level described above).

Learning Objects technology: this means that the user's learning experience will be traced according to the new SCORM standards (ExperienceAPI).

Evaluation

It concerns:

• users' comfort and satisfaction in the learning experience

• users' knowledge increasing level

• learning process efficacy (this evaluation is made according to the modification of the "abnormal situation" reported by the system

INNOVATIVE ELEMENTS OF THE MODEL

An innovative element of the application of this training model in the AAL system is the ability to keep track of what the user implies in terms of informal learning. As a matter of fact, the adoption of the standard API Experience is able to track the activities performed by the user, in terms of actions characterized and identified through the experiences, conceptualized in terms of Subject + Verb + Direct Object (I + did + this).
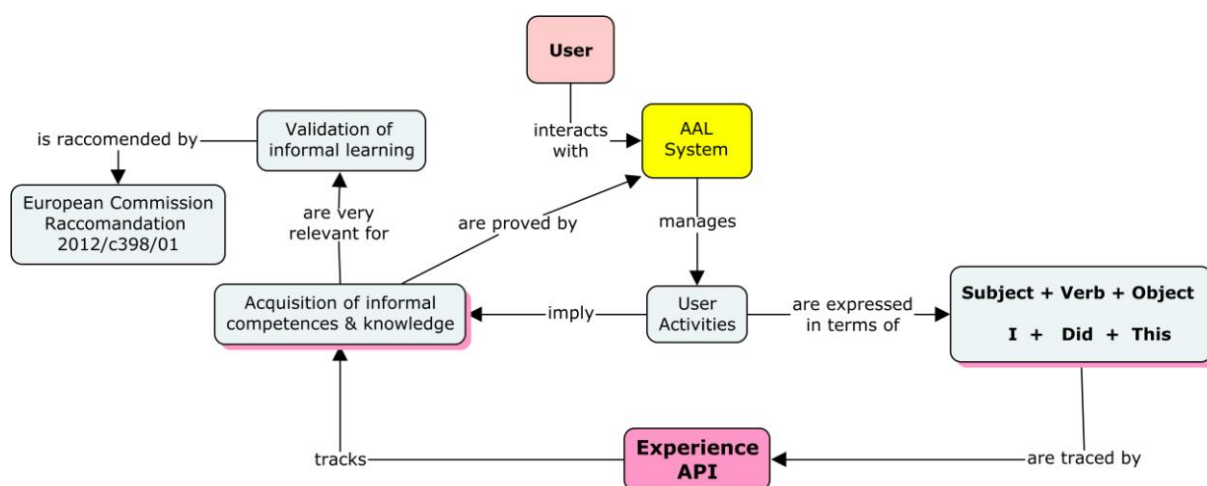
Therefore one of the benefits of the Helicopter learning model is the ability to decode the activity done by the user while using the available tools, in terms of "actions on an object" that, especially when repeated over time, defines the acquisition of knowledge and/or established competences: e.g. the ability to log in an information system, the use of a computer system in its generality, the research and the use of information from the internet about a specific content, etc.

The conceptualization of the Subject + Verb + Direct Object allows tracking experience by using verbs and direct objects well defined at the level of meaning (semantics); therefore from their analysis it is possible to report the acquisition of those skills obtained by the user while using the system, without his/her awareness and without a conscious intent of learning.

In this context, the informal training achieves objectives of competence that aren't aware. Its detection - and subsequent possibilities of valorization - is fully in line with the European recommendation to member states on the validation and certification of non-formal and informal learning[12]: the validation

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[12]. See European Council Recommendation 2012 / C398 / 01 on the validation of non-formal and informal learning.

of non-formal and informal learning is an opportunity heavily promoted in the Community and international seats, who look at it as a strategic element of innovation and optimization of learning systems, to enhance the value of people and their professionalism, as well as for the development of employability. In AAL, this opportunity applies in particular to the caregiver. The ability to track informal learning represents a plus of great value, as our society has by now recognized the need of transition from lifelong learning to the so-called life wide learning: that is a kind of learning that lasts a lifetime and that has no place only in formal institutions, but also in non-formal and informal ones.

Credit: Liz Burow (@Burlix)
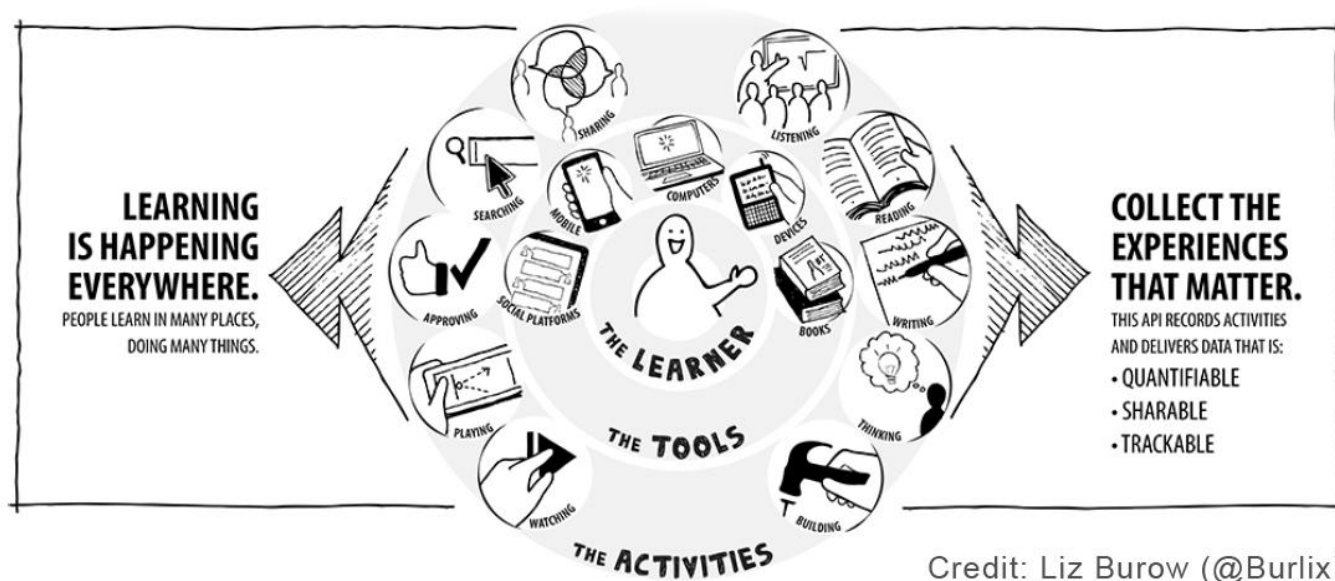
INDUSTRIALISATION OF THE MODEL

The data collected during the validation of the model will be more useful than ever for its industrialization: as a matter of fact, the objective of this process is:

- on one hand to identify those elements of the model that can be made trasversal, i.e. those modes of design and delivery of training content that, as they are "basic", can be a learning ground common to several types of users;

-on the other hand to establish processes and procedures for instructional design and implementation of the various training materials that allow to fine-tune format easily replicable and adaptable to the variety of contents and ways of using that affect the project target in its various forms.

THE APPLICATION OF LEARNING MODEL TO THE HELICOPTER PROJECT

In the conceptual framework of AAL, the HELICOPTER proposal aims at exploiting ambient-assisted living techniques to provide older adults and their informal caregivers with support, motivation and guidance in pursuing a healthy and safe lifestyle. As a matter of fact, according to demographic data, there are now more elderly people who live longer than in the past and this trend is increasing.

Consequently, the purpose of the HELICOPTER system is to provide elderly people with tools and supports improving well-being and quality of life (that means elderly people feel safe, aren't worried about their present and future, are able to manage their own life at home, in an independent way). Three are the main roles involved in the HELICOPTER project: 1) providees, 2) caregivers, 3) physicians, but only the first two are relevant for the proposed Helicopter Learning Model. A providee is an aged person (over 65) that uses the HELICOPTER system to achieve an improved quality of life as well as the ability to manage his/her own life. A caregiver is someone who provides care to the providee if requested, by doing activities that the providees cannot do by themselves. A caregiver can be formal (e.g.: a nurse or a hospital), or informal (e.g.: a relative or a friend). HELICOPTER system attempts to support these roles to provide providees support in their daily tasks as well as other important activities (e.g.: rehabilitation, keeping track of food consumption, etc.), by 1) continuously performing an early and coarse diagnosis of health-related problems, thank to an automatic triage of the data provided by different sources in and outside the house (e.g.: wearable devices, home automation, clinical devices), databases, on-line services (e.g.: weather forecasts) as well as maintaining a dialogue with the provide; 2) providing visualizing progress towards motivating daily goals on activities easy to comprehend and to realize (e.g.: if a goal on movement per day has been set up, the system monitors the movement made by the provide and feedback how much he/she is close to the goal); 3) supporting providees in participating in a open source social media that allows them jointly be caregivers to each other, to check if they are feeling well, if they have any problem, etc.; 4) providing plans of daily tasks and activities to be performed as well as functionality for following up on plans.
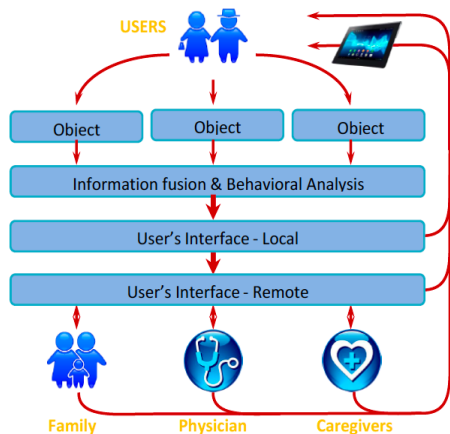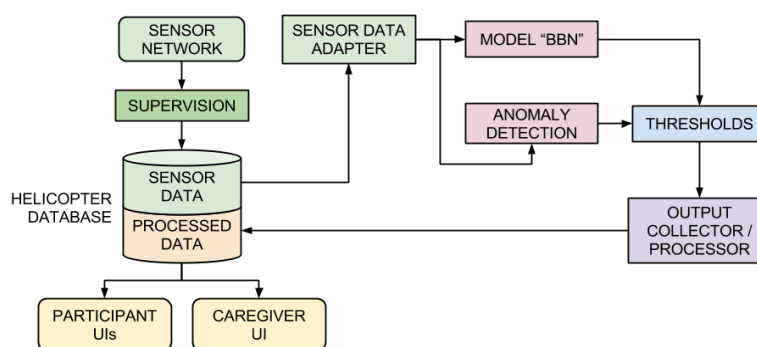
Fig. 1: HELICOPTER System functional view

The application of the learning model described above within the project occurs within the Helicopter Pilot phase and therefore takes into account both the characteristics of the critical issues implied in the realization phase.

The declination of the learning model in Helicopter sees then the following elements:

Target:

- elderly people as described in the project proposal**:** adults over 65, not suffering from major chronic diseases or severe disabilities, yet possibly being affected by -or being at risk of - metabolic or circulatory malfunctioning which are endemic for this class age (e.g.: hypertension, mild diabetes) or by mild cognitive deficits) and well sampled in the document People Centred Research (deliverable D2.1of the project, by Laura Boffi, CIID partner)
- caregivers (for the purpose of our model, mainly informal caregivers)

Learning contents

In the context of the Pilot Experience, stardard API is not adopted for the construction and tracking of specific learning contents (learning/training pills) but to detect, record and monitor activities that providees and caregivers realize in their interactions with the system. Referring to the learning model, the objective of the Pilot is in fact the identification and registration of informal learning that providees primarily and secondarily caregivers succeed to acquire thanks to the use and interaction with the entire system and the information it provides. This aspect is very important because of the European Council Recommendation 2012/C398/01 (validation of non-formal and informal learning): just as a result of this recommendation, a

number of professionals will offer functional informal learning environments; then investigate this aspect of the pilot and see how the recordings of the interactions made by provides with the learning environment can trace back to the learning unconsciously achieved, it is a definite surplus value of the entire project.

VALIDATION OF THE LEARNING MODEL

If possible and taking into account time limitations, the training model identified and defined within Helicopter project could be validated according to the following options:

a. development and evaluation of the compliance of the model to the needs and situational characteristics default by a panel of experts, consisting of representatives of the various types of stakeholders;

b. evaluation of the results emerging from a check list of indicators of effectiveness, efficiency and quality, applied to concrete use cases;

c. organization of a pilot for testing the model in situ;

d. survey on participants in the pilot, aimed at understanding if they have had awareness of the learning informally acquired.

CONCLUSIONS

What we have shown is the attempt to define a learning model able to support a set of products and services that are being developed and will be more and more developed in the future, to achieve the objectives of AAL. Indeed the products (smart objects) and services (information and automation) that can be activated in the AAL environment require:

- that users receive adequate training to become able to use them;

- that the support system has access to the data context (environmental data) and to the mode of use by users in order to offer services adaptable and adaptive to the end user.

Our model takes into account the need to customize the training / learning, the need to track user behavior inside the system as well as to infer the results of the informal learning that the user carries out during his interactions with the system.

Therefore the model intends to respond to the needs to:

1. train the end user within AAL;

2. trace the skills unknowingly acquired by the end user in its interactions with the system;

3. enable the development of products and services adaptable and adaptive, depending on how you use the system.

All this is based on an ontology already shared, which at the time was formalized only in the part related to learning (Experience API).

Certainly the model we have defined is not the ideal one, but it's what suits the concrete context and holds the assumptions for the technical / economical feasibility.

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