The FOOD Project: Interacting with Distributed Intelligence in the Kitchen Environment*

Laura Burzagli[1], Lorenzo Di Fonzo[1], Pier Luigi Emiliani[1], Laura Boffi[2], Jakob Bak[2], Caroline Arvidsson[2], Dominic Kristaly[3], Leonardo Arteconi[4], Guido Matrella[5], Ilaria De Munari[5], and Paolo Ciampolini[5]

[1] CNR-IFAC, via Madonna del Piano, 10 50019 Sesto Fiorentino (FI), Italy
[2] Copenhagen Institute of Interaction Design, Toldbodgade 37b, 1253, Copenhagen, Denmark
[3] Vision Systems SRL, Str. Aurel Vlaicu 61bis, 500188 Brasov, Romania
[4] Indesit Company SpA, via Lamberto Corsi 55, 60044 Fabriano (AN), Italy
[5] Università degli Studi di Parma, Parco Area delle Scienze 181/a, 43124 Parma, Italy
{l.burzagli,l.difonzo,p.l.emiliani}@ifac.cnr.it,
{l.boffi,j.bak,c.arvidsson}@ciid.dk,
kdominic@vision-systems.ro, Leonardo.Arteconi@indesit.com,
{guido.matrella,ilaria.demunari,paolo.ciampolini}@unipr.it

Abstract. Kitchen activities involve complex and articulate interactions with heterogeneous technologies and devices. In this paper, outcomes of the FOOD AAL-JP project are presented, related to the development of a kitchen environment implementing ambient-assisted-living features, aimed at increasing safety, autonomy, engagement and reward in dealing with food-related activities.

Keywords: ambient assisted living, smart kitchen, user-centered design.

1 Introduction

Many among daily living activities, are related to food: grocery shopping, food preparation, cooking, eating and kitchen washing-up are indeed a relevant share of the daily tasks. Besides its obvious link with health, food is important as a mean for social engagement as well: from time immemorial, having food together is a way for keeping and strengthening good relationships with family, friends or in more formal contexts. Also, food is a prominent cultural media, it is strongly connected to local cultural heritage, and is currently gaining more and more popularity in TV shows, books and magazines. Food impacts on daily life, therefore, well beyond its mere sustenance aspects. Notably also, food activities are among most complex daily living activities, very often requiring to the user considerable knowledge and mastering of a number of techniques, tools, appliances. Moreover, kitchen work implies several safety concerns (related to fire, flood, sharp tools, food preservation…). The altogether makes the management of kitchen activities a challenging and multi-faceted component of daily living, essential to support independent life and useful in fostering social participation.

* On behalf of the FOOD AAL-JP consortium.

C. Stephanidis and M. Antona (Eds.): UAHCI/HCII 2014, Part III, LNCS 8515, pp. 463–474, 2014.

Due to this, great effervescence is showing up in the market of kitchen appliance (so-called white goods). A growing number of ICT-enabled devices is coming out from research labs, and is approaching the user's market. Most innovative functions are related to appliance connectivity, remote operation and alternative user's interfaces (based on smartphones, tablet, or touch panels). Kitchen appliances, however, differ from most widespread consumer electronics with many respects. When considering a kitchen oven, for instance, interaction requirements are quite apart from those, e.g., of a personal portable audio device:

- The intended audience is much wider, including family members having different cooking and technology skills, different ages, feeding habits and preferences, and possibly dealing with disabilities and age-related impairments. This calls for the adoption of design-for-all principles, caring for usability and accessibility.
- The aimed lifetime of a kitchen appliance is usually much longer than most consumer electronic devices, possibly overpassing the lifespan of a given technology generation. Flexibility and re-configurability are needed to ensure consistent longevity to the on-board ICT components.
- Severe environmental conditions are to be accounted for. Due to heat, moist and dirt, rugged hardware is needed, and suitable interaction modes (e.g., hands free) have to be taken into account.
- Finally, kitchen daily routine usually implies interaction with more than one device: the adoption of a separate, independent (and possibly not uniform) interfaces schemes for each appliance is expensive, unpractical and unfriendly to the users. A more uniform and general approach needs to be implemented, this however requiring some standardization and interoperability efforts to designers and manufacturers.

The FOOD project, funded in the framework of the third call of Ambient Assisted Living Joint Program (AAL-JP), starts from the considerations above and aims at developing specific AAL services, dedicated to the kitchen environment, to support elderly people in carrying out food-related daily living activities and interacting with home appliances in a much simpler, safer and rewarding way. The project started in September, 2011and will last until February 2015. It involves 9 partners, coming from 5 European countries Denmark, (Italy, Romania, Sweden, The Netherlands).

A year-long pilot phase is just started, involving 30 households located in Italy, Romania and The Netherlands, in order to account for a wide variety of customs, cultural, social and economical features. The project is led by Indesit, a large company manufacturing white goods and ranking among lead positions in the European kitchen appliance market. Due to this, solutions devised within the project are being deployed in a truly market-oriented view, inherently accounting for sustainability and practicality.

2 FOOD Technology

The FOOD technical vision [1] is based on the seamless integration of sensors and "intelligent" appliances, aimed at offering innovative functionalities in the house, as well as Internet- based services and applications. Among them, specific emphasis is placed on enabling access, through a natural interface, to information and communication in different social environments.

The FOOD infrastructure includes first a field, peripheral layer of connected devices: environmental sensors and appliances communicate through a wireless network architecture, exploiting the IEEE 802.15.4/ZigBee protocol. The adoption of a wireless, standardized protocol reduces system intrusivity and allows for better interoperability, reconfigurability and flexibility. The main technical challenge, to this regard, was that of incorporating connectivity features within white goods, coping with tight cost constraints of a highly competitive market and with inherent safety needs. Two alternative approaches were followed: with reference to high-end, electronic-intensive machines, such as ovens, washing and dish-washing machines, connectivity is obtained by deploying a networking node within the on-board control electronics of the appliance. This enables bi-directional user interaction, i.e., status monitoring as well as active control are made possible. Within the FOOD project, a "smart oven" has been designed and introduced, based on such an approach.

Simpler devices, involving little or no active control needs (e.g. a fridge) have been monitored through external "add-ons", i.e., sensor boxes providing information about the appliance status without actually being part of the appliance itself. For instance, a small box placed inside the refrigerator allow for inferring opening of the door, internal temperature and humidity; in case of fridge replacement, the box can be easily moved to the new appliance, thus not adding to the appliance cost itself. Similarly, a sensor box is placed close to the hob plate, allowing for monitoring its status. Other environmental sensors account for safety monitoring (flood, fire/smoke, gas leak) and for tracking user interaction (presence sensors, door/drawer opening sensors).

Through the ZigBee network, data coming from the field are gathered at a central unit: here, data are abstracted, i.e., meaningful information is made independent of the actual physical sensor details. To this purpose, a suitable data structure has been devised, based on a basic ontology of the kitchen scenario. Data are stored in a database, which in turn enables supervision of the system and feeds a service-oriented architecture, providing local and remote services with web services for interacting with the system. User interfaces, therefore, access the system knowledge base in a standardized way, possibly allowing for multi modal interaction and for interoperability. Mostly important, through abstraction, kitchen related information converge within a unique interface scheme, almost independent of the actual control panels of each appliance, thus making it possible to control a variety of devices in a uniform, homogeneous fashion.

3 FOOD Services

Based on the infrastructure described so far, the FOOD project envisages a number of services related to feeding activities: besides more straightforward tasks (such as shopping list compilation, recipes management, etc.) the project aim at providing the users with innovative functions, preserving independence in daily life and eliciting inclusive potentials of food-related matters. A first service classification was made, based on the involved networking level and of the interface features; four main levels of services were identified:

Table 1.

Level	**Short description**	**Interface**	**Example**
0 **Basic**	Stand-alone services provided by sensors or basic functionalities of household appliances.	Sound alert/appliance display	Oven lock door Flood alarm
1 **Intermediate**	Services based on data provided by household appliances and processed locally by the gateway	Appliances displays or external display	Energy consumption monitoring, appliance status check, reminders, shopping list compilation
2 **External**	Services with external providers	External display, Internet connection	e-commerce, social network
3 **Advanced**	Services combining appliance data and external providers	Tablet, PC, mobile, TV	See examples below

To design such services, a user-centered approach was exploited: however, a simple assessment of "user's needs", to be translated into system requirements, was felt to be ineffective in guiding the design process, since the project was not meant to just identify and improve actual weaknesses in the elderly daily life or current kitchen technology dedicated to them. A holistic approach was pursued instead, looking at kitchen activities in the more general framework of lifestyle and daily tasks, and investigating their links to physical and mental wellbeing.

At the beginning of FOOD project an extensive field work in Italy, The Netherlands and Romania was carried out, aiming at meeting elderly in their own context (their home, neighborhood, and city) and at gaining insights on the process of ageing through direct observation and interaction. More specifically, their perspectives on food, food preparation, eating, shopping, cooking and social aspects of food were investigated: *what motivates elderly to cook and eat? What role does food play in relation to their health and physical and mental activities?*

Insights were gathered and organized, clustering them in categories (planning food, getting grocery, cooking, eating, storing food) and enabling the partnership to identify a set of emerging "opportunity areas":

- **Proactive behavior against ageing watersheds:** elderly challenges their brain and body with activities that are undermined by the aging, from filling crosswords to refresh their cognitive capability to going out to the day care to keep a social life.
- **Keeping elderly involved in their context as active characters:** being aware of services and possibilities offered in their neighborhood works as a motivation to make advantage and take part to their local community.

- **Freedom to find their own custom solution:** in order to suit their needs and overcome their limits, elderly evolve new behaviors and adapt their environment and equipment to them.
- **Food as a touch point of elderly social life:** around food, elderly enact their active role in the family and may rediscover a social life in seniority.
- **Support network as a scaffolding for elderly:** elderly reorganize their social network according to the help and support they need, often making neighbors and shop keepers become more crucial than relatives.

Based on this, a number of scenarios were described, suitable for evaluating potential services to be implemented and their impact on users' daily lives. A number of actions involving the FOOD system are highlighted in the following:

Scenario 1: *Maria Rossi is 75 years old. She does not have any permanent disability, but a normal decrease of visual acuity and hearing. Sometimes, she forgets what she is supposed to do. In the morning, when she is waiting for the milk to warm,* ***the fridge tells her****: "Maria, did you forget that you invited your granddaughter and her husband for dinner tonight?" Maria does not want to admit it with the fridge and she replies that obviously she did not forget. However, can the fridge suggest a menu for the dinner?* ***The fridge proposes a list of dishes****, according to the tastes and dietary habits of the guests, who often have dinner with the grandparent. Maria replies that the menu is OK, but fish is too expensive due to the economic crisis. Can the fridge suggest a less expensive alternative? She agrees with the new proposal, but she asks the fridge to look for a new recipe, different from the one used some months ago.* ***The fridge navigates trough the Web and selects some recipes*** *that, according to its knowledge, the guests could like. After the selection made by Mrs. Rossi, the fridge, on the basis of the RFIDs on the available products,* ***finds out what is lacking*** *for the execution of the recipe. After the authorization by Mrs. Rossi,* ***it connects with the supermarket****, asks for the necessary goods and arranges a delivery time compatible with the preparation of the dinner. Finally, it programs itself for* ***helping Mrs. Rossi in cooking*** *at the right time and for activating the kitchen appliances (for example, for switching on the oven). In the meantime* ***the gas is switched off before the milk can spill****. The kitchen tells Mrs. Rossi that the milk is warm enough.*

Scenario 2: *Guido Bianchi's wife died some time ago. He is not expert with the housework and particularly with cooking. He is not seriously disabled, but he is slightly depressed and this reduces his attention about elementary actions, as switching off the gas or closing the door of the fridge. It happened yesterday evening and* ***the fridge made him aware of the problem*** *with a sound signal. Today at 1 p.m. he has not yet moved from the sofa to prepare lunch. The sensors that* ***monitor activity near the stove*** *inform the FOOD system, which in turn* ***emits a speech signal*** *to make Guido aware that it is lunch time. Then Guido stands up. His tablet, suitably programmed,* ***suggests a recipe compatible with the diet*** *suggested by his doctor for a person who is diabetic. The tablet on which Guido takes note of what food he bought and has eaten, confirms that he has at home all necessary ingredients. He starts to cook according to the* ***single steps suggested by the tablet****, but midway he has some doubts. He calls his daughter using Skype. He gets help for cooking and is also very* *happy to hear his daughter's voice. The food is ready. The gas is switched off. No alarm signal is audible. He sit down to eat, but before he calls the daughter to tell her that he was able to cook the food. Since the recipe is simple and the dish is tasty, he decide to* ***share it on the network*** *and asks other people's comments. The "network" friends are happy to be contacted, because it means that Guido is less depressed than yesterday.*

Scenario 3: *Giovanni and Vanda are old married people. Giovanni is becoming not self-sufficient, due to mild dementia. Therefore, Vanda, even if she suffers of cardiac and visual problems, is able to cope with the situation with the help of the children, who do not live with them. Moreover, Giovanni and Vanda are living in a small village and the neighbours are willing to help, for example taking care of the shopping or sharing time with Giovanni when Vanda has some urgent need outside home. The children are also able to help her remotely using the Skype videoconferencing system.*

At home, they have installed an intelligent control and communication systems, based on the computers in the appliances and an external service provider. The modern home appliances help Vanda in her everyday activities. The ***interaction with them is simple****, both using their panels or the tablet coming with them. With the tablet, she can also control them when she is not at home.*

They are also able to take care of the ***power consumption****. Giovanni was taking care of it, but now he not able any more. Moreover, the data* ***are accessible also by the children****, who can help if the parents spend more than their income allows. Moreover, security is not a problem as well. Water, gas and the running of the appliances are under control and the alarm signals are active.*

Every week the children, who have trained Vanda to use the home system, bring up to date the list of the activities to be carried out. They are shown at the right time on the tablet or on the display of the oven. The tablet allows her to enlarge the text on the screen and this is very useful due to her reduced visual ability.

She likes the home system. For example, she is not afraid any more to forget some medicament for the husband. ***The home system takes care of reminding it****.*

At the beginning, Vanda had some problems to accept the tablet, but now she is comfortable with it. It contains the ***list of the shops****, the list of what the family needs every week and with some effort from her side the list of what is really available at home. Shopping is easier. From the tablet she can* ***call the shops*** *or send a message. She has a set of standard messages, prepared by the children. They are able deal with her everyday needs. She is now accustomed to this virtual butler able to help in many tasks. Vanda leads a secluded life at home with the husband. She lacks the contact with her friends and she discusses this problem with the service provider. She likes to cook in general, but now there is the additional problem that she and the husband must follow specific regimens due to their illnesses. A* ***service for the exchange of recipes*** *is set up, based on video-telephony. She can discuss of food and recipes with friends,* ***get the recipes from a common database****, see what* ***they are cooking in their kitchens****, and show what she is doing thus giving the possibility to correct errors. She is in a community of people with the same interests and can be helped with her diet.*

Within the project, only a subset of functionalities suggested by the scenarios above have been implemented, due to time, costs and effort constraints: a number of possible services enabled by the FOOD environment were devised, classified according to the schemes above and to the involved system components, and eventually mapped onto the opportunity areas. A sample, non-exhaustive list of services may include:

Environmental Control: deals with safety and energy managements. Provides the user with safety warnings and alarms, and monitors current energy consumption of kitchen appliances, manages load balancing to prevent black-outs (due to excessive power request), task scheduling, e.g., according to hourly energy tariffs.

Food Management: includes management of databases related to available food and recipes, allowing the user to plan her/his meal according to what's actually available in the food storage, to dietary prescriptions and habits, and looking for suitable recipes.

Shopping: helps the user in compiling a shopping list and keeping track of the food inventory. Also, it may enable, depending on local conditions, access to e-commerce facility or connection to local grocery shops.

Cooking Companion: enable users (possibly suffering from mild cognitive impairments) to carry out cooking tasks by providing them with step by step guidance. Selected video recipes may be available in a video format, guiding the user though all subsequent steps. A suitable user interface is needed, and the system should be capable of getting feedback from appliances and sensors (just to check if the oven has been set at the appropriate temperature, for instance), in order to issue context-aware messages and automatically manage the video flow.

Wellness Monitor: information gathered from appliances and sensors are exploited to infer behavioral patterns, to be correlated with wellness and health conditions [2]. Simple checks can be carried out on the frequency of using main appliances: for instance, if the fridge has not been opened for two days, this may indicate lack of appropriate feeding. Not using stove/oven for a period may suggest loss of motivation/interest in eating/preparing food, etc. In a more general sense, an overall "kitchen activity" evaluation can be carried out, allowing for early identification of problems inducing functional and psychological decline. From repetitive/disordered activity patterns, also hints about possible cognitive issues can be worked out.

Senior Chef: is a social networking application for physical neighborhood, aimed to create opportunities of engagement with local seniors in planning meals, shopping and eating together. FOOD technology is exploited for supporting networking activity.

Cooking Academy: is a cooking tutoring network run by elderly in favor of their peers, in order to share their recipes, e.g., with foreign caregivers of elderly, chef of elderly homes and single elderly who need/want to learn cooking in their late age.

Ready Steady Cook: oriented toward food education, exploits networking system facility to connect user's kitchen with professional chefs and nutritionists, sharing the cooking time and interactively guiding users toward rewarding experiences in preparing tasty and healthy foods.

Not all of the above service has been implemented yet, while all of them went through a subsequent development design step known as “service blueprinting” [3], whose aim is to map all the interested actors, touchpoints and technologies involved in a service onto an user journey.

4 Designing and Iterating the FOOD Services and Interfaces

4.1 The Process of Service Blueprinting

As IDEO service designer Fran Samalionis frames [3] when designing a service with a focus on whatever driver (may it be business, technology or customer), we need to bring along the whole process all the other dimensions that the user experience consists of. Failures happens as soon as we ignore or consciously leave out from the process actors, stakeholders, technologies, artifacts and interfaces that the service is constituted of. When designing a service, you are actually taking care of an ecology that needs to be nurtured, and not just survive, through every design decisions and implementations that is taken and carried out and through every interactions that happens at different levels among the components of the service.
In order to describe the service ecology, the tool known as “service blueprint” comes to help to map the various actors and components of the service and the interactions among them along time.

The service blueprint tool has been adopted by the FOOD consortium and partners teamed up in groups to address the services listed in section 3, working together and iterating the blueprints. A template to facilitate the blueprinting process has been developed and distributed to partners, with brief instructions on how to use it especially meant for those ones which were dealing with such a process for the first time.

The service blueprint starts with laying down an user journey in its timeline, step after step, revealing the hidden and less obvious ones we do not use to think of when we describing a service. For the FOOD project we envisioned that more than one user could be involved in a particular user journey, such as of course the elderly person, his/her caregiver, the shopkeeper, etc. depending on the service and the particular scenario we were considering (Fig. 1).

Soon after the user journey, we mapped the touchpoints, which are all the different tangibles through which an user accesses the service along its timeline and subsequent steps. For the FOOD services, the touchpoints cover a big range of possibilities: from the computer, the phone, the tablet and any kind of FOOD paper leaflet, to the kitchen appliances or alarms interfaces, such as the oven display (Fig.2).

It is essential to think of all the touchpoints in totality when we start describing a service in order to come up with a coherent system that fits the steps of the user journey and its logical sequence. Regarding what an user is aware of while using a service, the user journey and the touchpoints are known to him/her, that is why in the blueprint map they are placed above the so called “line of visibility”, laying onto the “on stage” area of the map.

Below the line of visibility instead, laying in the "back-stage" area, all those actors and components of the service which are not immediately interacting and visible to the users stand, such as the FOOD system component (the oven, the sensors, etc), the medical doctor, the national health service, the FOOD nutritionist, just to give some few examples (Fig.3).

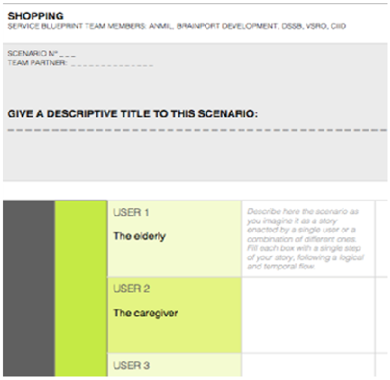

Fig. 1. A detail from the blueprint template showing the prospective multiple users in a FOOD Shopping service user journey and the instruction to fill it in

Fig. 2. A detail from the blueprint template showing some of the possible touchpoints

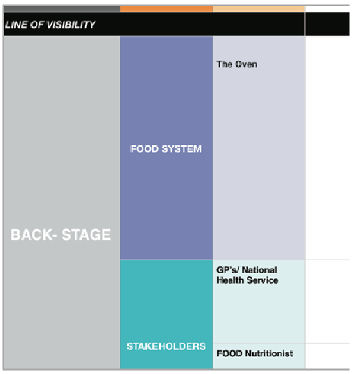

Fig. 3. A detail from the blueprint template showing some of the back-stage components blow the visibility line

The collective activity of blueprinting in groups allowed drafting different user journeys per each service, each journey describing a particular scenario of use. Moreover, the process helped out revealing misunderstandings among partners about their preconceived ideas of the services and allowed to agree on a shared vision of them to be implemented into working prototypes.

In the pipeline of the prototype implementation, the service blueprints were also preparatory to the wireframe process of the FOOD service application, running on tablet. The blueprints were then handled to the partner in charge of developing the wireframes and GUI for the FOOD app.

Mock ups of the screens have been developed (Fig.4) for some of the services mapped out in the blueprints, such as the Shopping, a basic version of Cooking Companion, Safety and some scenarios from the Food Management. In the design of the wireframes and GUI, it was decided that in order to let the users perceive the FOOD app as a consistent and unified experience, the services would have not been labeled and split into their "working" names, but they would coexist on the tablet screen tied up into a seamless journey. Later the services have been implemented into a proper working tablet application (the FOOD app) and released for the upcoming pilot with seniors in The Netherlands, Romania and Italy.

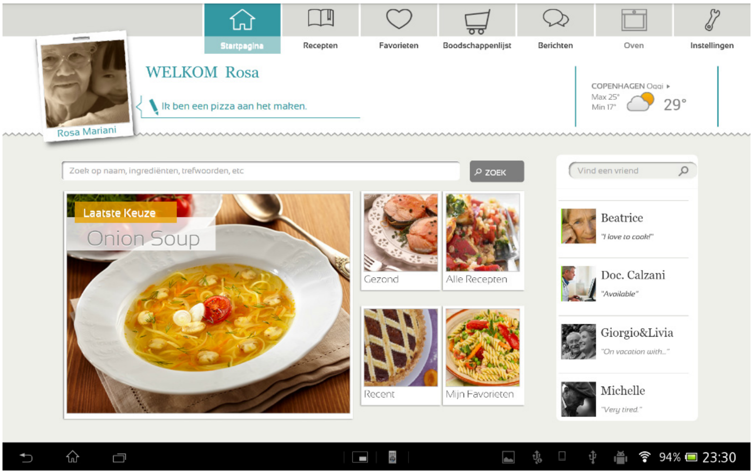

Fig. 4. A mock-up screen of the FOOD application running on tablet, dutch version

4.2 The Kick-Off the Pilot and the Design Research Kit

With the initial FOOD tablet application designed and implemented, the Pilots of the FOOD project are finally ready to be tested out in real-life situations. Pilots purpose is twofold: *i)* testing the technology designs and their reliability under the stress and unforeseen circumstances that arise during in-situ use and, *ii)*, understanding the uptake and appropriation of the technological innovations by the elderly participants – and whether this incurs actual changes in their dietary and social habits.

These two agendas are being dealt with through the pilot in two overarching Pilot research tracks. There is an evaluation of the developed service and technological innovations, in both qualitative and quantitative terms, to assess the functionality, usability and feasibility of such socio-technical service systems through actual implementations. The second track is concerned with further developing the developed systems based on the real-life feedback from the Pilot implementations.

The project has planned and executed the initial steps of the Pilot deployment of the services at the time of writing. The pilot planning has taken the above aspects into consideration through testing the systems developed as iterative prototypes deployed in a live use-context, rich with socio-technical inter-weavings of extra-system-specific dependencies and contingencies. This is done through enlisting the collaboration of the project consortium's user-group partners, who can closely follow and support the daily use of the services by the Pilot participants.

The Pilots consist of three very different European locations, each with their own set of cultural values and traditions, namely Brasov, Romania; Fabriano, Italy and Eindhoven in the Netherlands.

The elderly participants of these locations speak three different languages, have three different cuisines and differ in various ways in their social make-up. The Pilot planning, therefore, is focused around the user-group partners deploying specific site teams that engage with the elderly participants in their local language and with a cultural understanding that can facilitate the introduction of the developed service systems.

The deployment has been split into two parts: introduction of the participants to the hardware and services, and a following data gathering phase, where quantitative data from the implemented systems as well as qualitative data gathered directly from the participants. The gathering of quantitative data will be described elsewhere, but for the qualitative data gathering we would like to describe in more detail the process involved in the collection and its intent, as it is a crucial part of testing and further developing the systems through the holistic approach mentioned in section 3.

Initially the system introductions to the elderly participants has to be preceded by instructions to the site teams in each Pilot location, to train the involved staff how to instruct the participants in using the services and related technical devices. Detailed manuals of the software have been developed, in collaboration with the user groups partners. Manuals serves as a physical support object in both the training of site teams and participants and as boundary objects between the different cultural and technological life-worlds of participants and developers.

The training process involves introducing the site teams to the software interface, the manual;, how to instruct the elderly participants and how to collect qualitative data on subsequent visits.

To enable qualitative feedback from the participants, a design research tool kit is given to the elderly, to help them remember specific experiences with the services and to ease sharing at the subsequent visits of the site teams. The design research tool (Fig.5) consists of two equally important share-back parts: a physical diary where the participant writes, on a regular basis, negative and positive feedback about the interaction with the hardware, and about their habitual patterns in everyday life, since installation, in terms of physical and mental well-being as well as social interaction enabled by technological services. The second part of the design research kit consists of a photo gallery together with a physical description document, both tightly connected to the written journal. This encourages the elderly participant to interact with the tablet and take photographs of important situations connected to their experiences.

The diary and the photo gallery work as two parts of the same feedback collection, with the intention of providing the elderly with the chance to share feedback in different media. After the initial Pilot kick-off in Brasov it has already become clear that providing both a physical and a digital feedback possibility is crucial, since the participants have very different levels in terms of usage experience of digital device.

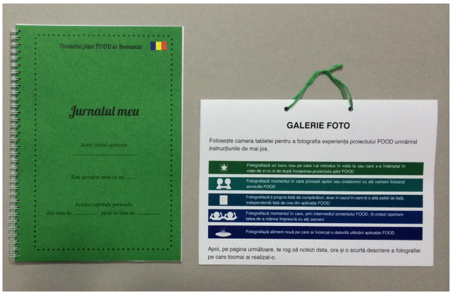

Fig. 5. The Design Research Kit, Romanian version: diary and photo gallery

In the months following the Pilot kick-off Pilot locations will be visited by research team on a 2-6 months basis, to gather and analyse data collected by the site team members. Such data, together with diary entries and pictures, will provide interesting insights for the actual use and further development of the FOOD technologies. After the one-year period of the Pilot, the qualitative data from the participant sites will get synthesised into a qualitative evaluation of the Pilot phase in terms of usability and impact on the daily life of the participants, as well as recommendations for developing the services into more market-ready solutions, based on meaningful and contextualised interactions for the elderly users.

Acknowledgements. This work was carried out in the framework of AAL-JP project (project code AAL-2009-3-66), jointly funded by EU and national agencies of participating members.

References

1. Allen, J., Boffi, L., Burzagli, L., Ciampolini, P., De Munari, I., Emiliani, P.L.: FOOD: Discovering Techno-Social Scenarios for Networked Kitchen Systems. In: Encarnação, P., Azevedo, L., Gelderblom, G.J. (eds.) Assistive Technology: From Research to Practice, AAATE 2013, vol. 33, pp. 1143–1148. IOS Press (2013)
2. Losardo, A., Grossi, F., Matrella, G., De Munari, I., Ciampolini, P.: Exploiting AAL Environment for Behavioral Analysis. In: Encarnação, P., Azevedo, L., Gelderblom, G.J. (eds.) Assistive Technology: From Research to Practice, AAATE 2013, vol. 33, pp. 1121–1125. IOS Press (2013)
3. Moggrdge, B.: Designing Interaction. Cambridge. The Mit Press (2007)