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Assistance solution for improving cooking skills and nutritional knowledge
for Independent elderly people

D 2.4 – M6 Report on the state of the art

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6	ASM Market Research and Analysis Centre Ltd.	ASM	SME	Poland
7	ME.TE.DA. s.r.l.	METEDA	SME	Italy



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Table of Contents

1. Executive summary.....	7
2. Overview and methodology	8
3. Cloud	10
3.1 Existing market solutions	10
3.2 Press reports and publications.....	17
3.3 Patents	21
3.4 Standards / Open Frameworks	21
3.5 Other approaches	22
4. Interface	25
4.1 Existing market solutions	25
4.2 Press reports and publications.....	36
4.3 Patents	37
4.4 Standards / Open Frameworks	37
4.5 Other approaches	39
5. Robot / Food processor	40
5.1 Existing market solutions	40
5.2 Press reports and publications.....	45
5.3 Patents	45
5.4 Standards / Open Frameworks	49
5.5 Other approaches	49
6. Other peripherals	50
6.1 Existing market solutions	50
6.2 Press reports and publications.....	52
6.3 Patents	53
6.4 Standards / Open Frameworks	53
6.5 Other approaches	53
7. Conclusions	54
8. References	55
9. Annex.....	56

Table of Figures

Figure 1 - Cook'n recipe organizer app running in Windows	11
Figure 2 – Perfect Diet Tracker app running in Linux	12
Figure 3 - Tracker2Go	12
Figure 4 - Diet Assistant Pro-Weight Loss screenshots	13
Figure 5 - Diet Assistant Pro-Weight Loss records.....	14
Figure 6 - Weight Watchers screenshots.....	15
Figure 7 - Barcode scanning	15
Figure 8 - MetaDietaMobile meal selection	16
Figure 9 - MetaDietaMobile quantity selection	17
Figure 10 - Scheme of this Perumal's et al (2008) smart home environment	18
Figure 11 - GoldUI system architecture.....	19
Figure 12 – Inclusion Society system architecture	20
Figure 13 - Scheme of these monitored home appliances and its related cloud computing	21
Figure 14 - Panasonic smart appliances scheme; all of them controlled by an Android smartphone and Cloud services	23
Figure 15 - Panasonic mobile application.....	24
Figure 16 - AEG Voxtel M800 smartphone	25
Figure 17 - Doro Liberto smartphone and tablet	27
Figure 18 - RakuRaku F12D.....	27
Figure 19 - Interface layer from UIU Mobile	28
Figure 20 - Cubigo user interfaces.....	28
Figure 21 - User interface of Silverline program	29
Figure 22 - Care Pack by Silverline.....	29
Figure 23 - Phonotto user interface	30
Figure 24 - LinkedSenior user interface.....	30
Figure 25 - Screenshot of GoLivePhone® (on the left) and screenshot of GoLiveAssist® (on the right).....	31
Figure 26 – Pingo Doce website with shopping list highlighted on the right.....	32
Figure 27 – BigOven: Home page on website	33
Figure 28 - BigOven website: detail from diabetic menu plan	33
Figure 29 – Allrecipes website homepage.....	34
Figure 30 – Allrecipes GoogleTV user interface	35
Figure 31 – Allrecipes Drag and drop feature of menu planner.....	35

Figure 32- DiaFit project	36
Figure 33- Susan Revan Keyboard size recommendations.....	38
Figure 34 - Yämme features	40
Figure 35 - Offered recipes for Yämme	41
Figure 36 - Recipe preparation on Yämme product and recipes website	41
Figure 37 - Moulinex Cookeo.....	42
Figure 38 - Thermomix device by Vorwerk.....	42
Figure 39 - Vorwerk product and its app site	43
Figure 40 - Ladymaxx Gourmet, by Singer.....	44
Figure 41 - An image of this Kimac America TV video	44
Figure 42 – Food project architecture according to deliverable 3.1	45
Figure 43 - Product diagram of WO2011069833	46
Figure 44 - Communications scheme from KR20130023599	47
Figure 45 - Communications scheme from EP2336642	47
Figure 46 - Recipe displayed, database scheme and user interface from JP2004294864	48
Figure 47 - Recipe displayed once is created according to JP2006329455	48
Figure 48 - Frank & Robot movie poster	49
Figure 49 - FitBit scale model Aria	50
Figure 50 - Withings scale WS-30 and pressure monitor	51
Figure 51 - iHealthLabs scale and blood pressure	52
Figure 52 - Verizon’s converged health management	52
Figure 53 - Arrhythmia Inc, patent diagram	53

Acronyms / Abbreviations / Glossary

- API** – Application Programming Interface
- App** – Short for Application
- BMI** – Body Mass Index
- EMR** – Electronic Medical Records
- HCI** – Human-Computer Interaction
- IEEE** – Institute of Electrical and Electronics Engineers
- IT** – Information Technology
- OS** – Operating System
- SOAP** – Simple Object Access Protocol
- Sync** – Short for Synchronization
- UI** – User Interface

1. Executive summary

The state of the art on current services and models is a strategic document containing the closest known solutions to ChefMyself. The review is based on existing products, publications and any kind of knowledge in general related to the fields of interest in which ChefMyself project is involved. The aim of this document is to establish the technical basis of the ChefMyself project, and define the innovative areas in which it will play.

The partners involved in this task are Taurus, Unie KBO, INRCA, and ASM. They provide respectively their experience and expertise in the interest fields of this state of the art, such as technical knowledge, user experience and market prospection and assessment. According to the ChefMyself system expected architecture, this document is subdivided into 7 sections, containing a quick overview of the ChefMyself project concept, the used methodology and its sources, the studied fields, and final conclusions drawn upon the analysis of the actual trends involved on these field applications.

2. Overview and methodology

The primal goal of the ChefMyself project is to develop a customizable, open and extensible ICT service ecosystem built around an automatic cooking solution to support elderly people in preparing meals, thus maintaining healthy eating habits.

In order to achieve this goal, a complete system composed by a web services platform accessible through different devices and offering different contents and options to improve nutrition will be offered. The service platform is complemented by a food processor with an accessible interface, which is specially tailored for the elderly, and will be developed to encourage elderly people to self-care, according to their particular nutrition requirements. At the same time, and as a part of the web offered services, a social network, focused on the topic of nutrition and ageing in good health, will become a tool to motivate elderly people to be active and maintain existing social relationships, and to create new ones.

Technological main areas to be treated on this report fit with each of the modules identified as being part of the architecture of the ChefMyself system to be developed, comprising the services, user interfaces and support kitchen robot. According to this, the main components and the related technologies to be stated for each of them are:

- Cloud services module: Comprises the ChefMyself service portal itself and all the related web based services hosted in the Cloud that will be accessible through different user interfaces. The technologies involved in this module include all IT communications related issues, such as the proper protocols to be used for data interchange, system architecture considerations for the deployment of the Cloud hosted web services, services interconnection and operability, remote devices and computing, involved data and design of the databases to host the involved information and more.
- User Interfaces module: The study of the state of the art for this module involves aspects referring to the user interfaces, such as the trends related to the design and development of special applications targeting elderly people with regards to how the layouts, colours, controls, fonts, contrast, and other elements must be designed to fit their requirements while taking into account any other general guidelines on design of User Interfaces (UIs) for older adults.
- Robot / Food processor module: Both hardware and software aspects related to the development of this innovative cooking device involved in this module will be considered. It involves the cooking kitchen robot hardware development itself but also some other issues related to the communications of the cooking device with other modules devices, such as the UIs and web services Cloud. It involves some other devices that can be used as extended devices on the ChefMyself system.
- Other peripherals: The ChefMyself system is going to be designed and developed on a flexible and scalable way that will let other three party devices to be connected to the ChefMyself system, thus taking advantage of the functionalities offered by its built-in web based services. Of special interest for this section will be those devices that are able to be connected through Wi-Fi to external services, offering an integration API that allows interoperability with external platforms. Some examples of these devices are Wi-Fi scales, which obviously due to the functionalities they provide could be of great interest to be used in conjunction with ChefMyself services as an extension of these services.

The state of the art is important to be considered not only for the technologies involved in the development of each of the modules that composes the ChefMyself solution, but also as part of the methodology on how these services will be offered, and on which kind of business models these are offered. Accordingly, some other information sources have been consulted to retrieve information about the most usual business models regarding how potentially similar services are being offered:

- Market existing solutions: A market search on the existing and similar solutions to ChefMyself and its related fields has been performed. We consider also keeping an eye on the market during project development. Furthermore, we expect to maintain good information sources, keeping alive a technological surveillance through the internet, based on searches about similar solutions through the use of different keywords (e.g. kitchen robot, nutrition cloud services, etc.) and keeping in contact with manufacturers and retailers information. The latter can be done essentially thanks to TAURUS's participation on the ChefMyself project.
- Press reports / Publications: Not only the "raw" internet, but also the written or online press has been inspected on the search of potential information. This has been a documentary search about similar ideas and solutions. Information sources that are being used to get information are: internet searches based on Google, publications from universities, and opinion leaders.
- Patents: This is a documentary search about Patents that can disclose aspects of this project. Useful information sources we have used (and plan to keep using in the course of the project) are: WIPO, Espacenet and USPTO databases.
- Standards: This is a documentary search about Standards, which can also disclose aspects of this project. Useful information sources we have used (and plan to keep using in the course of the project) are: IEC, CENELEC, UL standards database.
- Other approaches: For any other kind of information we consider relevant any kind of source is welcomed on this area.

3. Cloud

This section focuses on the state-of-the-art of Cloud web-based accessible services. Within this definition, the actual trends on the architectures of the Cloud services in general have been included, paying special attention to the services that are related to home appliances communications and control, diet guidelines, food recipes, weight control, and other related fields involved in, or of interest to, the ChefMyself system. Cloud services offered through the Internet in particular have been therefore observed, especially if these are targeted at elderly people.

3.1 Existing market solutions

Existing market applications have been found mainly on the mobile devices market in form of smartphone apps which rely on services hosted on the Internet following the cloud services architecture. These smartphone apps act usually as the user interface (UI), and offer access to the users' data through the interface provided by these mobile devices. In this sense, several market solutions referring to diet and/or weight control have been identified. These applications are operated in a mobile device, such as a smartphone, which provides the UIs to access the services, while user data is stored and managed on a cloud based system. Examples of such solutions are:

- Cook'n recipe organizer¹: This software is available in multiple platform including Windows, Mac, and Apple or Android smartphones operating systems. The app allow users to organize and manage cooking recipes with additional features, offering functionalities such as sharing recipes with other users, scaling recipes to adjust serving sizes, nutrition facts calculator, shopping lists, etc... All data managed by the user is synchronised cross platform in all different devices managed by the user thanks to the implemented Cloud services platform architecture.

¹ <http://www.dvo.com/index.html>

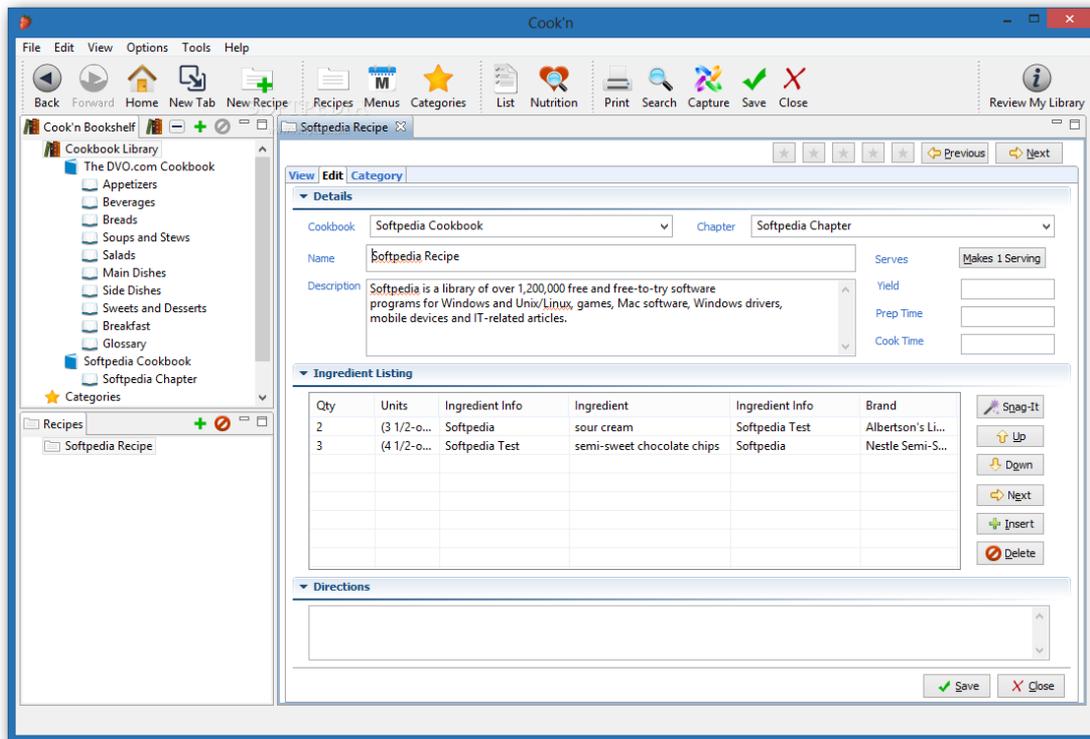


Figure 1 - Cook'n recipe organizer app running in Windows

- Perfect Diet Tracker²: This software is also available in multiple platforms such as Windows, Mac, Linux and smartphones based on Apple and Android operating systems (the mobile/smartphone app is called Tracker2Go). The app provides help to the user on his or her diet plan, offering a large food database with more than 100.000 products. Taking profit of this huge amount of information, the personalized parameters configured by the user, and the registered intakes, the system is able to track the user's diet, providing useful nutritional information, such as the calories counting, and different functionalities which even include suggestions for the creation of a diet plan with the aim to reach the user's target weight. This can be used as a multi-user app, where each user can create and configure his or her own profile with own information protected by a username and password. However, its Cloud synchronization is quite simple, according to the app specifications, taking profit of the synchronization mechanisms and frame provided by a set of tasks based on Dropbox architecture.

² <http://www.perfect-diet-tracker.com/information.html>

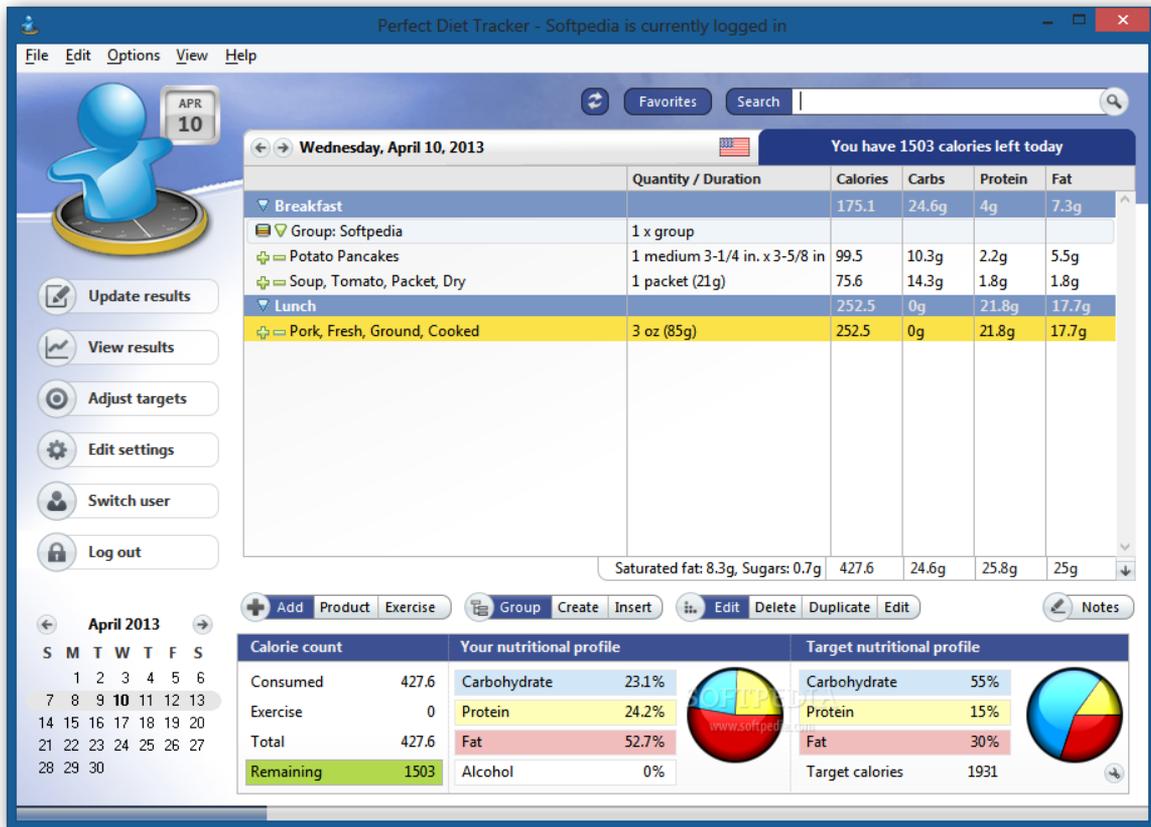


Figure 2 – Perfect Diet Tracker app running in Linux

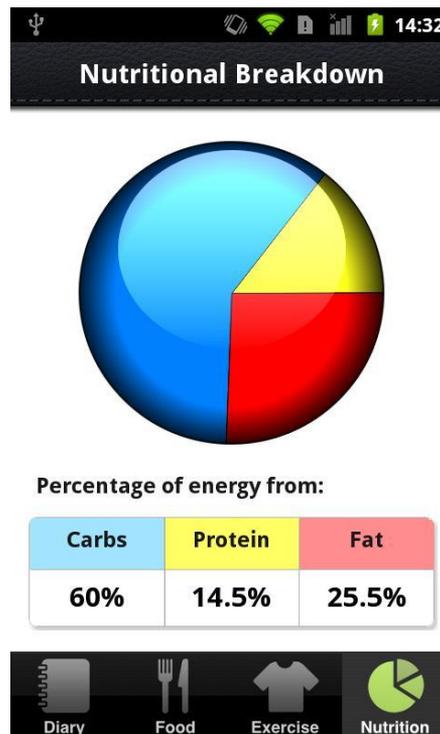


Figure 3 - Tracker2Go

- Diet assistant Pro - Weight loss³: This is another example of apps for smartphones related to nutritional control and diet. It is specially targeted at the diet control. This app is quite popular and widely used according to the more than 2 million downloads it registers, and it is focused on helping users with their dietary requirements. The application also implements a kind of social environment providing a chat to share the weight loss experiences among users. Its approach into the Cloud is in regards to its forum and chat, which are hosted on the Internet and are accessed through the interface provided by the application. Related to the cloud services also, there is the feature to share with other users which diets work best, and the Backup and Restore database capability, with its data stored in the Cloud. Nonetheless, this app target is far away from ChefMyself's purposes, as it is more related to weight loss than to improving nutrition habits, but still on the field of interest.

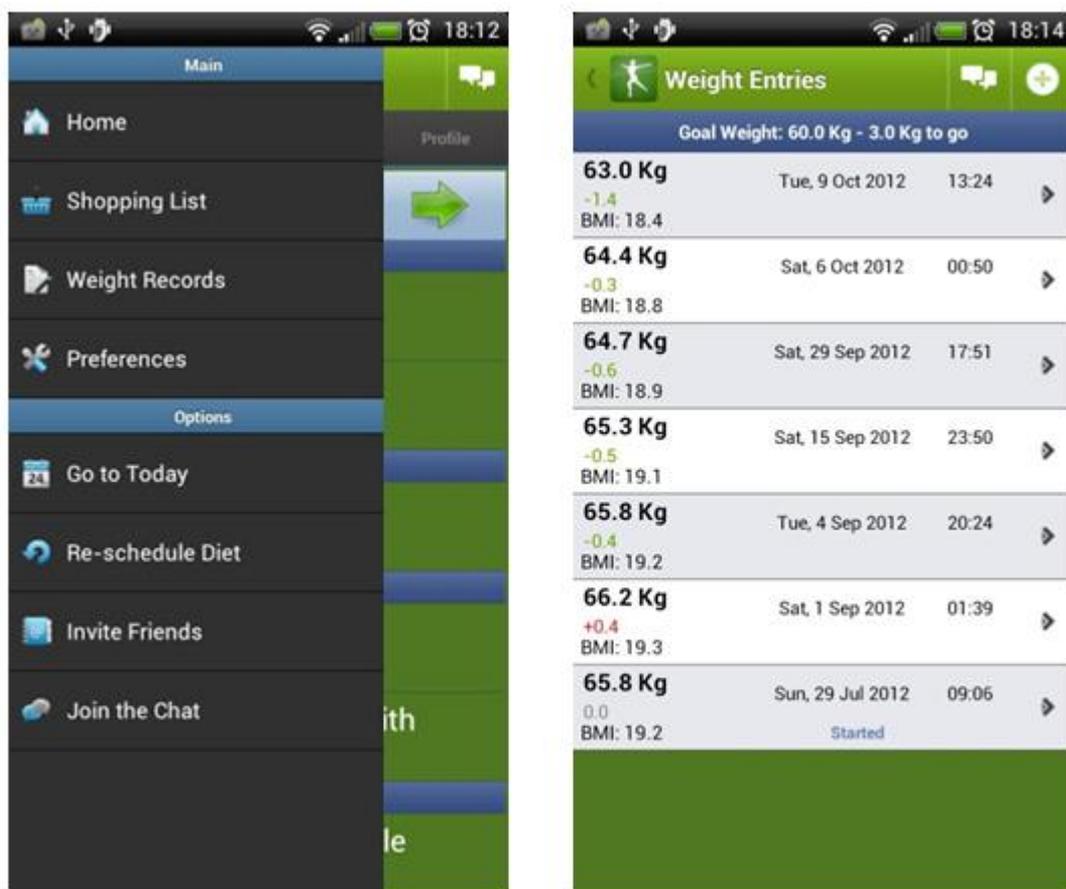


Figure 4 - Diet Assistant Pro-Weight Loss screenshots

³ <https://play.google.com/store/apps/details?id=com.aportela.diets.pro.view&hl=en>



Figure 5 - Diet Assistant Pro-Weight Loss records

- Weight watchers⁴: This is the name of an American private company with more than 50 years' history and experience, focusing on people's weight loss. The company offers a lot of services consisting of a personalized diet plan, group meetings, publications, web services... and actually also provides a set of apps for smart devices using Android and iOS operating systems. This set of apps is targeted to help users on their diet, by offering recipes with information related to their nutritional data, food products information directly through the scanning of their barcodes, activities and routines, weight tracking surveillance, and more. Part of the users' data are on the Cloud, and users can display this either on the smartphone with the application that provides the UI, or on the web site. However, their targets and focus audience are far away from ChefMyself's purposes, as this is also targeted more at weight loss rather than improvement of nutritional habits.

⁴ <https://play.google.com/store/apps/details?id=com.weightwatchers.scanner&hl=en>

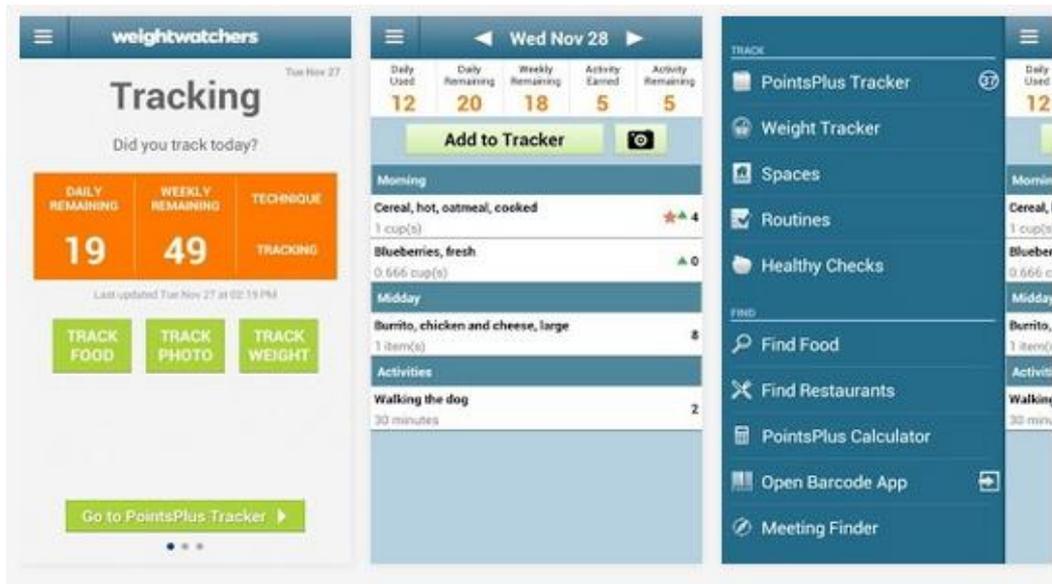


Figure 6 - Weight Watchers screenshots

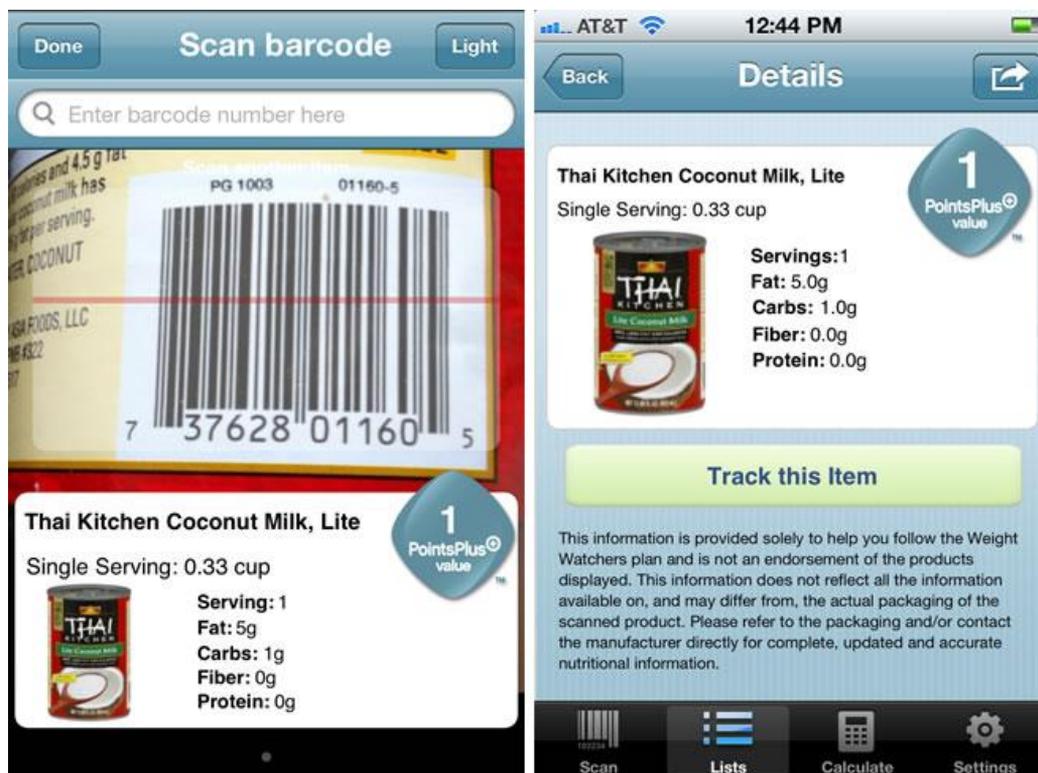


Figure 7 - Barcode scanning

- MetaDietaMobile⁵: This is another app for smartphones, which has been developed by the

⁵ <http://www.meteda.it/utenti-finali/metadieta-mobile-2/#>

ChefMyself partner METEDA. This application offers a different solution compared to other apps. The purpose of the application is not focused on “what you could eat”, but on giving instructions to the users about “how” to eat it. The application is not meant to force the users into eating something they don’t like. The users can continue eating their favourite foods, but with the help of the application, now on the appropriate quantities, according to their needs, and with the aim to reach their weight goal. The strong points of this app are visuality and intuitiveness of user interface. Its approach to Cloud technology lies only on the fact that the data are updated directly to the servers.



Figure 8 - MetaDietaMobile meal selection

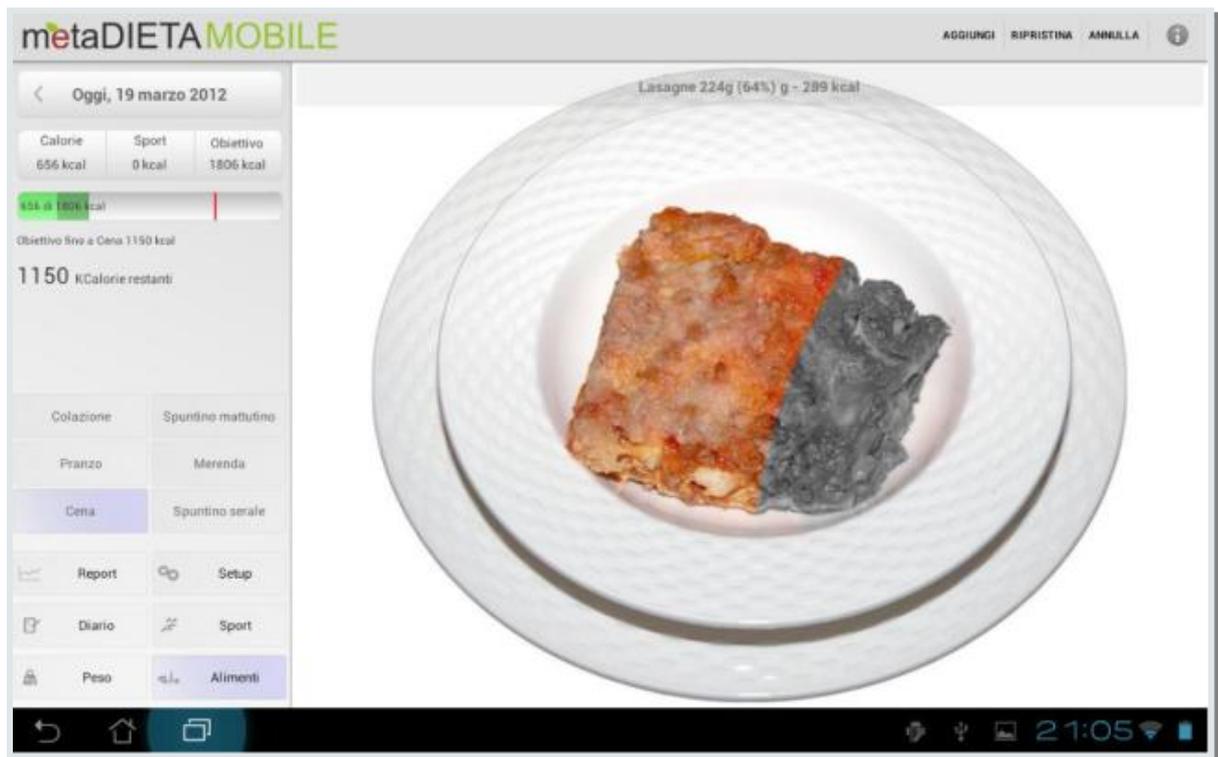


Figure 9 - MetaDietaMobile quantity selection

3.2 Press reports and publications

Not so many relevant documents have been found regarding other applications on the fields of interest of ChefMyself implementing the kind of applications like the ones described above. However, some documents focusing on interoperability and actual trends on Cloud computing services architecture should be mentioned:

- The document from Perumal, et al. (2008), “Interoperability for smart home environment using web services”⁶, is an approach on Cloud computing and home needs, such as home entertainment, home automation, energy management, surveillance, and health care. They have based the approach on TCP/IP message exchange based on SOAP (Simple Object Access Protocol). Nowadays this technology is quite obsolete, especially for Cloud computing.

⁶ Perumal, T., Ramli, A. R., Leong, C. Y., Mansor, S., and Samsudin, K. (2008). Interoperability for Smart Home Environment Using Web Services, *International Journal of Smart Home*. 2(4), October, 2008.

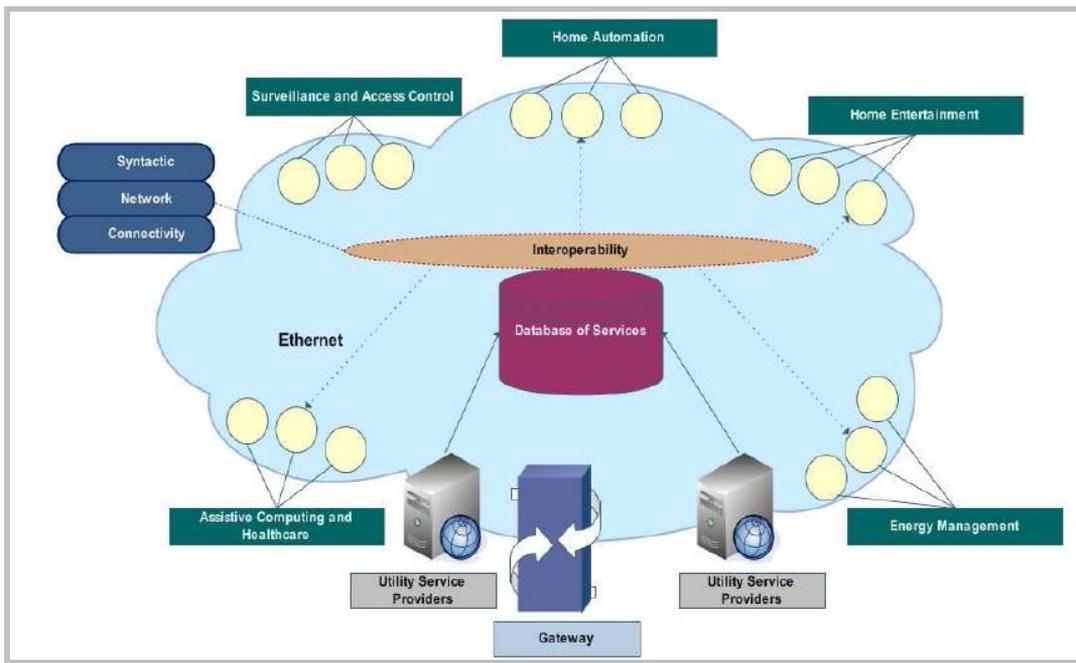


Figure 10 - Scheme of this Perumal's et al (2008) smart home environment

- Due to the fact that Cloud computing is a relatively new concept, its development, technology and architecture undergo continuous evolution. Because of that, the specialized web site called “Cloud Platform Trends”⁷ is following-up all this evolution, with daily periodicity, posting the latest news to the community etc. Some interesting posts are about the trend of using hybrid Clouds, in which a part is public and another part is private, resulting in public and private Clouds operating together. It is also quite common to find articles that describe Cloud computing architectures and discuss some topics related to it. For instance, “about.com”⁸ is a specialized publication on IT which describes the actual advantages and disadvantages of Cloud computing, as well as its trends.

Although these publications can be considered to fall within the fields of interest of the ChefMyself project, any of the above mentioned applications can be considered to be targeted at, or meant to be used exclusively by, elderly people, and/or describe an equivalent solution to some of the functionalities that will be implemented within the ChefMyself services. None of them, however, is designed specifically for elderly users and their particular needs/abilities, especially in regards to customized user interfaces. Their scope is more related to the architecture to be considered and find out about the actual trends in the field.

Some other different projects that have been considered relevant due to their use of Cloud computing services are mentioned and briefly described below:

⁷ <http://cloudplatformtrends.com/>

⁸ <http://mobiledevices.about.com/od/additionalresources/a/Cloud-Computing-Is-It-Really-All-That-Beneficial.htm>

- GoldUI⁹: This is an AAL-JP project which aims to improve the independence and participation of older people, to whom technology may be a serious issue. This project aims to develop a system that allows the user to access a large variety of Cloud-based services through multiple devices and communication channels while keeping the same user profile (language, eyesight, hearing, mobility and memory capabilities) that can be defined by a trusted carer or relative. Some of the services available on GoldUI are local news, music player, weather forecast, reminders for personal events and appointments, remote e-shopping or social life.

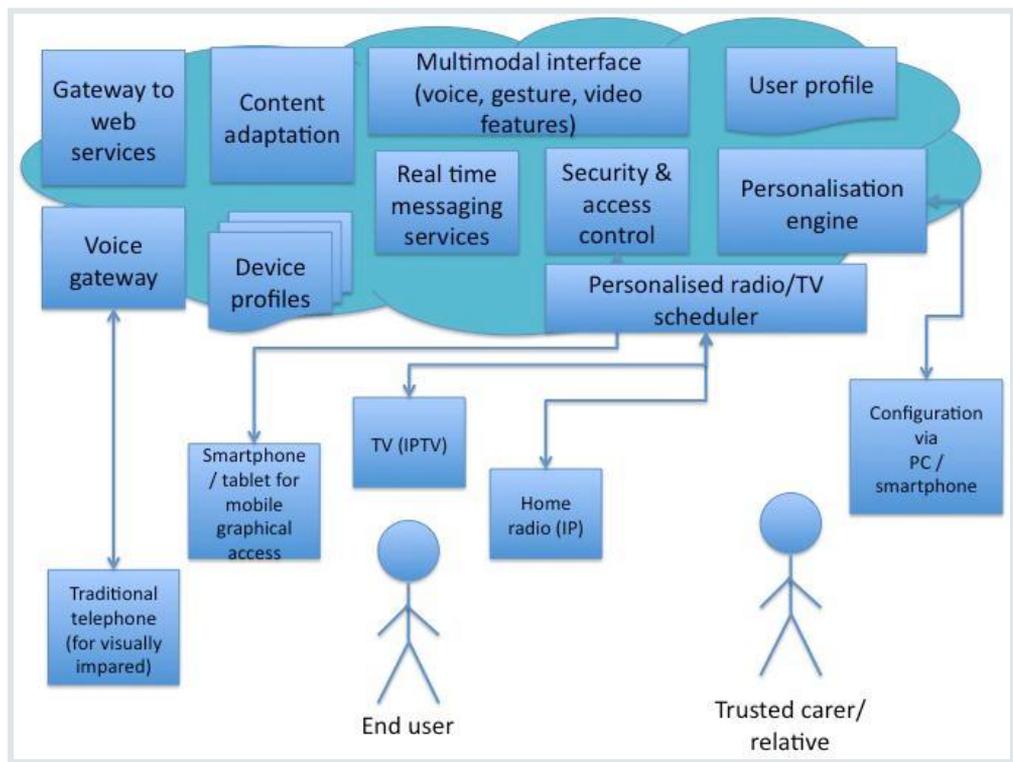


Figure 11 - GoldUI system architecture

This project is in a totally different scope than ChefMyself, although the use of Cloud services to keep a user profile that allows a simpler and more efficient way of interacting with the system from different devices is a characteristic that ChefMyself must also achieve. However, the level of detail to the interfaces of GoldUI is aimed at a more restricted target group (with specific impairments).

- Inclusion Society¹⁰. This is another AAL-JP project that provides a preventive health solution for senior citizens at home and in institutions, by providing a management portal with an overview of Service Users condition and data collected by medical and “smart home” sensors. The system has 4 main components:

⁹ <http://www.goldui.eu/?lang=en>

¹⁰ <http://www.inclusionsociety.com/wp/>

- 1) The HomePad, a simple and intuitive way for the user to interact with the system;
- 2) Friends and family portal, which facilitates communication and remote care;
- 3) NursePAD, designed with high usability; and
- 4) EMR function for nurses visiting senior citizens at home or institutions.

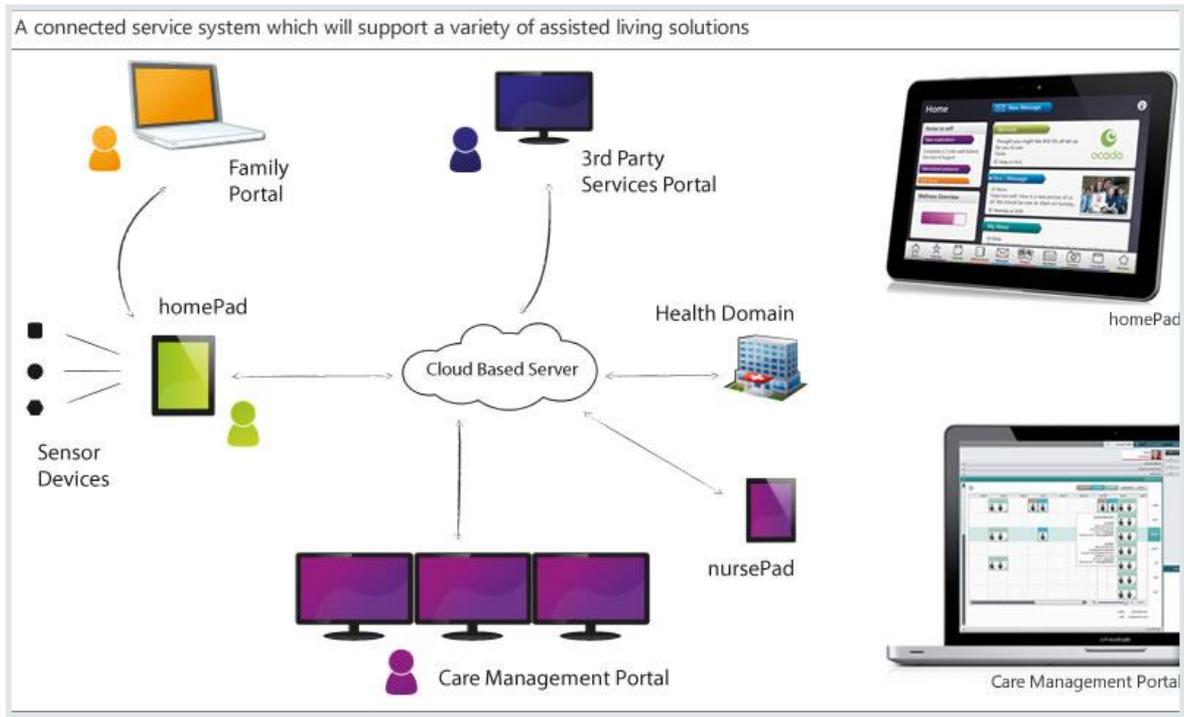


Figure 12 – Inclusion Society system architecture

Although not in the same scope as ChefMyself, the use of the Cloud that connects different devices to a Cloud based user profile is similar to the one that will be used in ChefMyself.

- Cloud4ALL¹¹: As stated on the project website, this is a “European Commission FP7 grant that will develop key parts of the GPII, building the knowledge base and algorithms needed and evaluating the ability of the concept to work across platforms, technologies and applications”. It is envisioned to allow customizing accessibility preferences and have this profile available on any device using the Cloud.

Cloud4ALL aims to be the gateway to be used by its user to access any server blocking any malicious content and keeping the interface friendly to people with any kind of impairment (visual, motor, cognitive, hearing and speech). Although it is not directly aimed at elders, it has a high impact on this group, as it is planned to address specific impairments and accessibility options which older adults might benefit from. This project focuses on the use of Cloud-based assistive technology and Cloud-based desktops to augment the accessibility when necessary.

¹¹ <http://www.cloud4all.info/>

3.3 Patents

As Cloud services are more likely related to the definition of services architecture provided through the internet, there are no relevant patents, or at least no relevant patents regarding the trends or fundamentals of Cloud computing were found, although per closest prior the following example can be described:

- Patent EP2595098 from Chiao Tung University describes a method (algorithm) to measure the user's satisfaction, or as they said the "users feedback" on home appliances. They use a Cloud computing structure to process the input data received from these appliances, the input data is generally the operating mode of these appliances, i.e.: on/off status triggered by voltage or current changes.

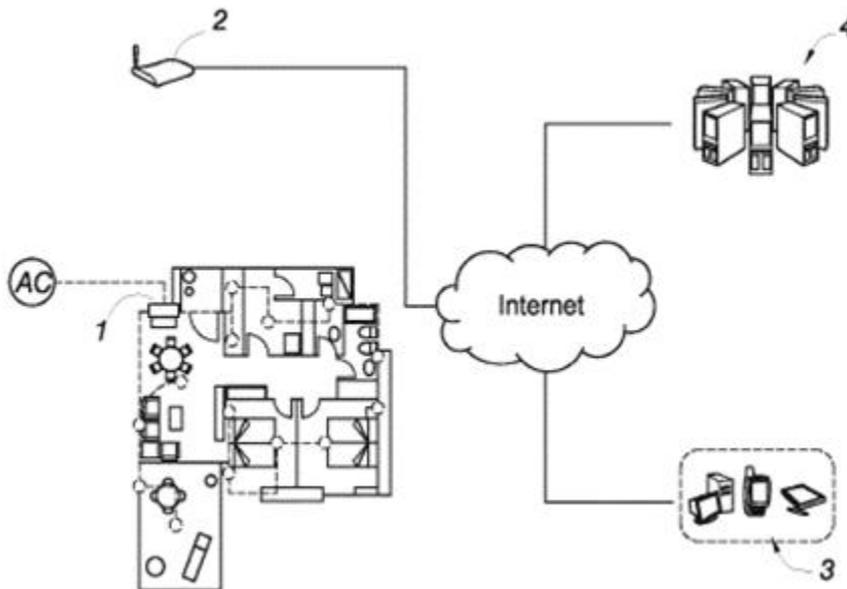


Figure 13 - Scheme of these monitored home appliances and its related cloud computing

3.4 Standards / Open Frameworks

No harmonised or compulsory standards are involved on Cloud computing so far, anyway the IEEE (Institute of Electrical and Electronics Engineers) seems the most active organisation that aims to establish some standards on the following subjects: Cloud architecture, Cloud to cloud data exchange and migrations, and also Cloud quality aspects. They have created an expertise group named "Cloud computing standards study group" and their work is in progress.

Actually, the most important providers of Cloud services, such as Amazon (EC2), Google, and Microsoft, use their own standards. For the second group of providers (HP, AT&T, Rackspace, OpSource, and others), third party Cloud platforms are used, making it quite difficult to switch from one platform to another. Below there is a list of the most important players and the platform technology they use:

1. VMware¹²: is the platform used by AT&T (America's largest IT provider) and OpSource. VMware is a software company that grew up on data centre management and machine virtualization. Nowadays, and based on their large knowledge on these fields, they have become a leaders on Cloud computing software.
2. OpenStack¹³: used by HP, and Rackspace. This is a cloud OS and, as VMware, it is focused on IT providers, big data management and processing.
3. Microsoft¹⁴: has two products based on Cloud computing:
 - Azure, a simple app (end-user oriented) that does not require Cloud management. It allows users to share data and run apps on the Cloud.
 - HyperV¹⁵, a Cloud platform (at the moment, no important IT providers are following them), with the aim to provide the base software, that will allow the customers to build their own Cloud apps by using their own servers. Their commercial policy is focused on trying to catch customers from VMware (they offer a specific tool to migrate from VMware to HyperV).
4. Amazon (EC2), and Google: are also considered leaders on Cloud service provision. Both use their proprietary standards.
 - Amazon web services¹⁶ offers support and solutions based on their AWS architecture to build users' Cloud applications.
 - Google¹⁷ offers an app that allows customers to build host applications in a simple and intuitive way, by using the same infrastructure of Google services.

Regarding the Cloud sync protocols, the OMA (Open Mobile alliance¹⁸) can also be introduced. Since 2002 this organism is pushing up for a standard multi-platform protocol, the project name is "syncML", and the idea is to sync certain user data (basically contacts, calendar, notes, tasks, e-mails...) across devices via the internet.

3.5 Other approaches

- Last August, 21 2012 Panasonic¹⁹ announced their plans to develop smart home appliances. The official concept presentation was made during IFA Berlin 2012. The idea is to let users be in control of their appliances remotely via an Android application and additional Cloud services. It seems that their plans are to add this feature to some existing large appliances which they have already developed, such as: air conditioners, refrigerators, washer-dryers, small appliances (e.g.

¹² <http://www.vmware.com/>

¹³ <http://www.openstack.org/>

¹⁴ <http://www.windowsazure.com/en-us/>

¹⁵ <http://www.microsoft.com/en-us/server-cloud/hyper-v-server/default.aspx>

¹⁶ <http://aws.amazon.com/architecture/>

¹⁷ https://cloud.google.com/products/app-engine?utm_source=google&utm_medium=cpc&utm_campaign=appengine-search-global&gclid=CL-qwp7NzboCFZMdtAod3D8A5g

¹⁸ <http://openmobilealliance.org/>

microwaves, steam cookers), and maybe, in the future, health care devices will be added on the product range too, such as blood pressure monitors or scales.

The related app, named “Panasonic smart app”, also has some descriptive recipes, (these recipes are not driving directly the appliance, they are there just as reference) and then also some diet and weight control contents.

At the moment we can’t confirm its market launch, (all the information we have got is related to press releases and Panasonic sites, no retailer information was found). Maybe it is just a pilot test, anyway, it seems that it was only promoted in Japan, and perhaps this is why some information (and the app itself) is only available in Japanese²⁰.

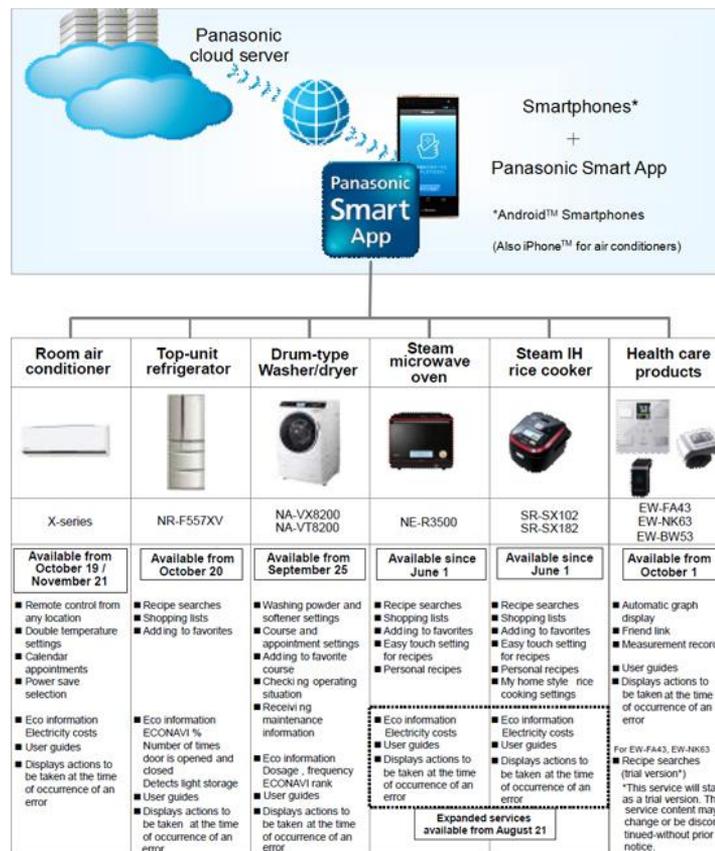


Figure 14 - Panasonic smart appliances scheme; all of them controlled by an Android smartphone and Cloud services

¹⁹ <http://panasonic.co.jp/corp/news/official.data/data.dir/2012/08/en120821-9/en120821-9.html>

²⁰ <https://play.google.com/store/apps/details?id=com.panasonic.smart.gemini&hl=ja>



Figure 15 - Panasonic mobile application

4. Interface

This section focuses on the state of the art regarding user interfaces on IT devices, and home appliances for elderly people, the trends on these interfaces, especially concerning their capabilities to make these fully-functional for the elderly specific user group. As the solutions are manifold, we concentrate our analysis on devices which are more closely related to the ones that are going to be used within ChefMyself.

4.1 Existing market solutions

There are plenty of market solutions for touch screen interfaces tailored specifically for seniors. Examples of such solutions are:

- Smartphone AEG Voxtel M800²¹: This is a smartphone from AEG specially designed in order to be used by elderly people. It was announced on the last IFA show, in 2013. Not only the touch screen user interface was designed for elderly people's use, even the phone shape is intended to be more securely handled by older adults.



Figure 16 - AEG Voxtel M800 smartphone

- Doro (Smartphone Doro Liberto, Doro phone and Doro tablet): Doro is a Swedish public company specialising in telecom products for elders. Collaborating with Veryday²² on the design of their senior-friendly phones, Doro has recently launched Doro Liberto²³, after the well-known prior versions of the Doro Phone. The company also embraces different devices through the Doro Experience²⁴. Tablet, desktop and smartphone interfaces are designed for specific older adults' needs and the service also includes a manager. At the last GSMA World Congress, in Barcelona (2013), Doro was showcasing their tablet and desktop solution which included not only communication applications, but also text editors and a spread sheet application.

²¹ <http://www.virtualmarket.ifa-berlin.com/?Action=showProduct&id=1419824>

²² <http://veryday.com/>

²³ <http://www.doro.co.uk/Products/Mobile-phones-and-accessories/Doro-Liberto-810/>

²⁴ <http://www.doro.co.uk/Experience/>



MINETUR Reference: AAL-01000-2013-18
AAL Reference: AAL-2012-5-120



Figure 17 - Doro Liberto smartphone and tablet

- Smartphone Fujitsu RakuRaku²⁵ F12D: Launched in August 2013, this is the approach to elder groups made by Fujitsu in Japan. It has been awarded Germany’s universal design award in 2013 and it has also a specific interface designed for a better experience for elderly people. One particular feature of this interface is that users are required to touch the buttons longer in order to trigger them. This is intended to avoid errors in tapping the wrong button and to provide the elderly with an experience closer to the traditional physical interaction with buttons, where users were required to push harder as compared to current touch screen interfaces.



Figure 18 - RakuRaku F12D

²⁵ <http://www.fujitsu.com/global/news/pr/archives/month/2013/20130814-02.htm>

- User interface layer UIU Mobile²⁶, This is a user interface app that allows customizing a common smartphone into a user friendly device specially designed for elderly people. Menus and contacts can be tailored, created and edited easily in a PC.

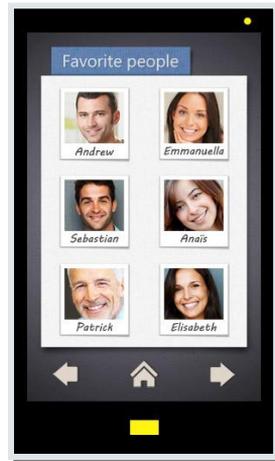


Figure 19 - Interface layer from UIU Mobile

- Cubigo²⁷ user interface: This is a service company from Belgium. Their business is to provide specific IT services to elders, such as a Calendar for medical visits, medication advice, and other activities. The service also provides news with no commercial announcements, contacts management and video calls. On all these apps they pay special care to the user interface and its operation.



Figure 20 - Cubigo user interfaces

²⁶ <http://www.uiumobile.com/>

²⁷ <http://www.cubigo.com>

- User interface layer Silverline program²⁸: This is a non-profit project from Singtel, a mobile operator in Singapore. The program is based on users' mobile donations (iPhone's 3 & 4). Singtel, who has created a suite of apps especially for older adults, resets and re-processes these phones, by installing these apps, which are then delivered to elders who previously have asked for it.



Figure 21 - User interface of Silverline program

Silverline has evolved and grown into Care Pack. This solution brings together different apps for the elderly end-user and for the caregiver. Furthermore, taking advantage of the Android platform possibilities, in this platform it is presented as a launcher, thus allowing to control the entire environment of use. Features of the Care Pack are as follows: Photographs, Calls, Medication reminders, Learn (daily headlines), Well-being (track healthy habits), Location (location track) and Emergency calls.



Figure 22 - Care Pack by Silverline

²⁸ <http://info.singtel.com/personal/silverline>

- User interface layer Phonotto²⁹: This is an Android app that provides a new user interface skin on a smartphone. It covers the basic functionalities of calling, contacts and messages.



Figure 23 - Phonotto user interface

- LinkedSenior PC application³⁰: This company promotes the stimulation of elders by using IT devices on their leisure activities. They offer kiosks on community common areas and experiences can be taken even in a group. The relevance for our prior art is the user interface design.



Figure 24 - LinkedSenior user interface

²⁹ <https://play.google.com/store/apps/details?id=com.gammapps.SimplePhone&hl=en>

³⁰ <http://www.linkedsenior.com>

- GoLivePhone and GoLiveAssist³¹: This is a comprehensive solution featuring a mobile solution for older adults and a supporting platform for caregivers. Amongst the features of the mobile application are: Fall detection, Activity monitoring, Agenda and Medication management, intelligent geo-fencing, and others besides the traditional communication features of mobile phones. The product has been tested with real end-users and has become a product of applied research.



Figure 25 - Screenshot of GoLivePhone® (on the left) and screenshot of GoLiveAssist® (on the right).

One approach that may be of interest to ChefMyself is the one taken by services that work across devices, as is the case of Cubigo. These may help to reduce the learning curve for older adult users and thus ease the acceptance and adoption of the technology. Taken together, the solutions presented above have some common features, such as increased button size, increased contrasts or reduction of the number of elements on the screen (avoiding cluttering). Not all solutions present the 3 features, but some present one of them or a combination of two. Some solutions (Fujitsu and Doro) include hardware design. Tablet or TV hardware design falls beyond the scope of ChefMyself, but the solutions may hint in the direction we should look for when choosing devices for product trials.

Most solutions are also for general communication and leisure purposes and do not focus around the subject of cooking, diet or nutrition.

Even though the solutions are alldedicated to older adults, literature lacks reports on usability testing or tests regarding user acceptance of such devices and interfaces. Literature, however, allows us to find tested and experimental examples which may guide our design and development process. These will be presented in section 4.2.

Beyond solutions on the market which focus on easier interaction (either for older adults, people with disabilities) and on dietary requirements, there are also plenty of solutions available for recipe search and preparation. On the course of future design and development tasks (related to the user interfaces), a more thorough analysis will be made to these solutions and on existing strategies to communicate recipe

³¹ <http://www.gociety.eu>

instructions, ease the search process, and other related actions related to food preparation. Nevertheless, we find it important to briefly mention some existing solutions in this domain.

- a) Pingo Doce³²: Pingo Doce is a Portuguese supermarket chain. It is included in the state of the art because it offers a service similar to the one described later ahead (section 5.1) in relation to the kitchen robot Yämmi. On its website, Pingo Doce has a dedicated section for recipes, and from each recipe it allows generating a shopping list, which can then be save on the personal account, printed or sent via e-mail. Upon login into the system, the recipes section also allows the user to insert whatever ingredients he or she has available at home and it recommends recipes based on these available ingredients³³.

The screenshot shows the Pingo Doce website interface. At the top, there is a navigation bar with links for 'LOGIN/REGISTO', 'NEWSLETTER', 'APOIO AO CLIENTE', 'LOJAS', and a search bar. Below the navigation bar, there is a main header with the Pingo Doce logo and the text 'Sabores Mediterrânicos'. The main content area features a recipe titled 'Bifanas com hortelã e salada de couves e esparguete'. The recipe includes a list of ingredients, a list of products needed for the recipe, and a shopping list on the right. The shopping list is highlighted with a blue box and labeled 'Shopping list'.

Figure 26 – Pingo Doce website with shopping list highlighted on the right

We can also note that the menu on the left allows browsing the recipes according to 1) type of meal (e.g. breakfast, starter dishes, and meat dishes), 2) special occasions, and 3) recipes with video instructions. It also has a culinary glossary which, beyond culinary definitions, also includes converters and reference value. The menu has a “step-by-step” section which explains how to prepare specific ingredients for different purposes (e.g. cutting meat in different ways). Finally, it includes an informative section about health and nutrition.

Even though the recipe section is quite limited as compared to other recipe websites, we chose to mention it because it includes sections which might be of relevance for ChefMyself, due its target audience. Step-by-step instructions are a goal of the project, while instructions on how to prepare

³² <http://www.pingodoce.pt/pt/receitas/receitas/>

³³ This service is already available on several international websites, such as “My fridge food” (myfridgefood.com) or the “Recipe Matcher” (recipematcher.com).

specific produce/ingredients and a glossary might be of great use to older adults, especially those who may happen to be novice cooks.

- b) Big Oven³⁴: Big Oven is a website designed to allow users to have access to their recipes at all times. This is achieved with mobile apps for iOS, Android and Windows Phone. It also has the option to generate shopping lists from the recipes and, upon login, it allows creating menus from existing recipes. There are existing menus (created by users) that range from one single meal to several days. One interesting aspect (in relation to ChefMyself) is that the user can also browse menus according to specific dietary requirements (e.g. diabetic, nut-free, or dairy-free). These contents are not, as far as we know, supervised by nutritionists or medical doctors.



Figure 27 – BigOven: Home page on website

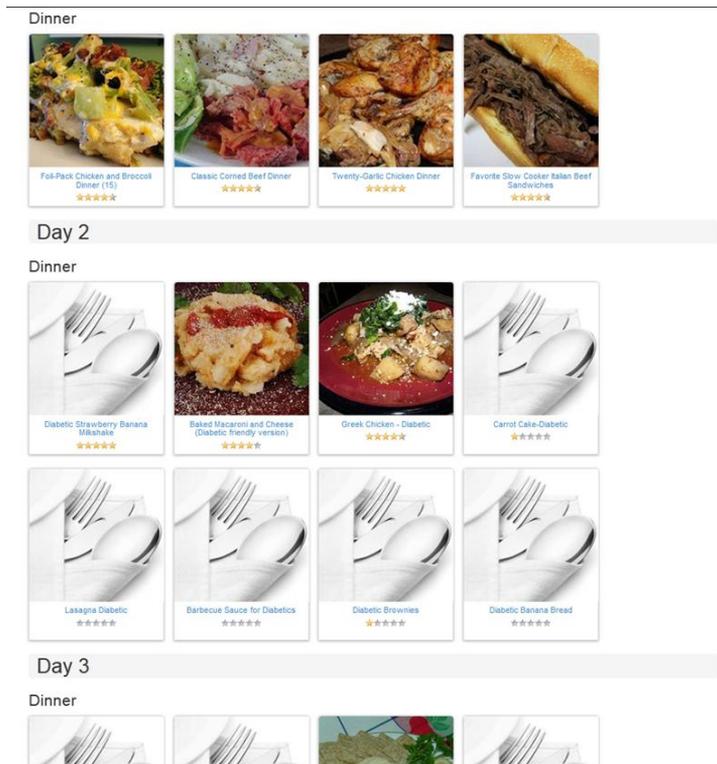


Figure 28 - BigOven website: detail from diabetic menu plan

³⁴ <http://www.bigoven.com/>

c) Allrecipes³⁵: As with BigOven, Allrecipes is accessible via web and via mobile applications (iOS and Android). We include the example here for two reasons: it has a drag and drop menu planner and it runs on Google TV. This is then an example of recipe management and menu planning through a TV interface. The contents in Allrecipes are both user-generated and curated. Furthermore, it has an interesting “cook mode”. This mode is to be turned on while the user is actually preparing the recipe. Instructions then are displayed in a cleaner interface which also displays a timer and option to move between steps. The Google TV does not have the “cook mode”, but allows browsing through the recipes and content in the network. Below are some handpicked images and screenshots referring to the different aspects we have highlighted.

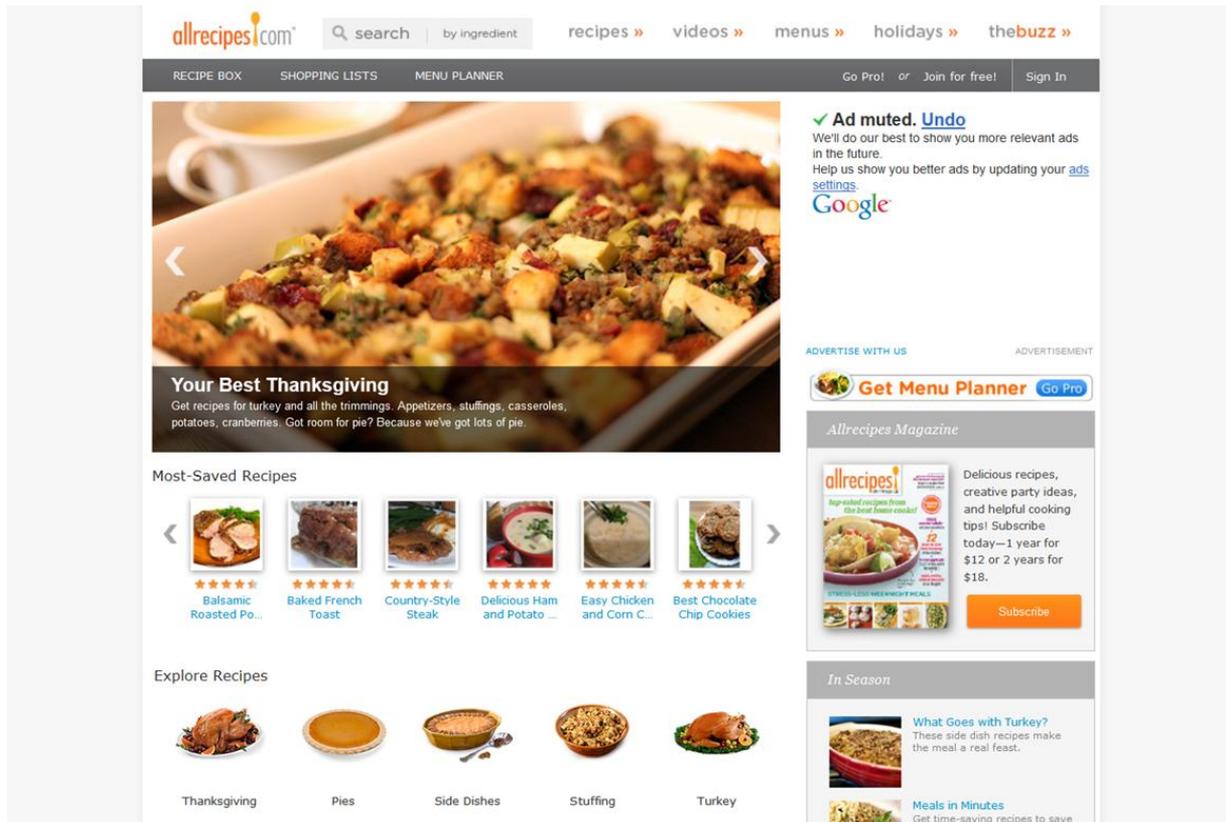


Figure 29 – Allrecipes website homepage

³⁵ <http://allrecipes.com/?sitepref=ar>



Figure 30 – Allrecipes GoogleTV user interface

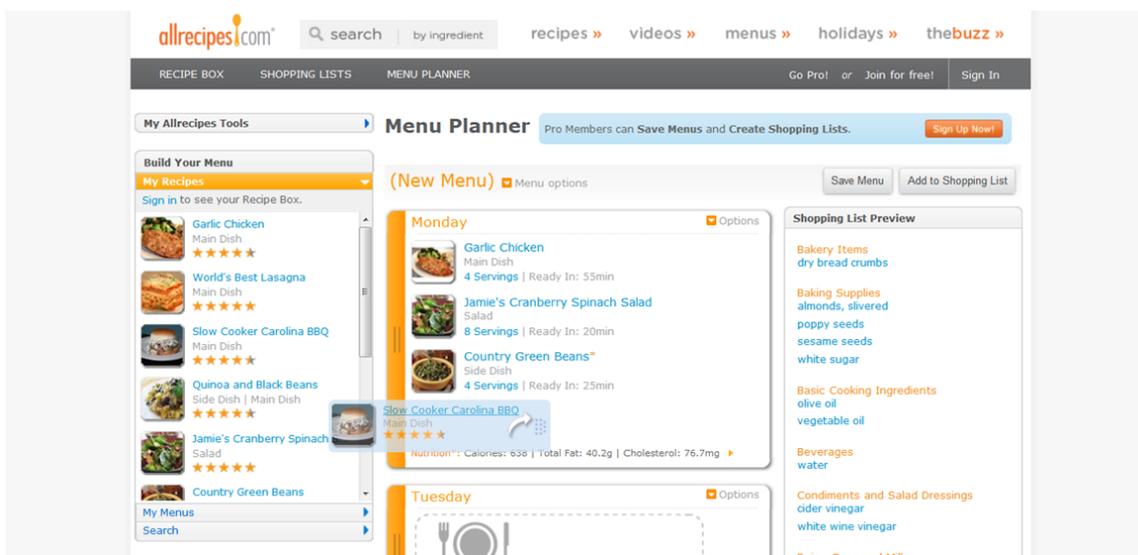


Figure 31 – Allrecipes Drag and drop feature of menu planner

Interesting as all the solutions are, they are not designed specifically for older adults. As mentioned before, these user interfaces will undergo a process of comparative analysis further along in the project. However, important features have been identified and these should be taken into account during our own design and development process.

4.2 Press reports and publications

The most remarkable reports concerning the scope of interest and based on previous experiences correspond to the development of a previous AAL project named DiaFit³⁶ (2011-2012). The main goal of this project was to provide a central contribution to the "Intelligent kitchen for seniors", as an assistant for a health-promoting diet. They focus specially on the user interface:

- Creation of Kitchen terminals as a natural interface for assistance
- Usability for real -aided design technology acceptance

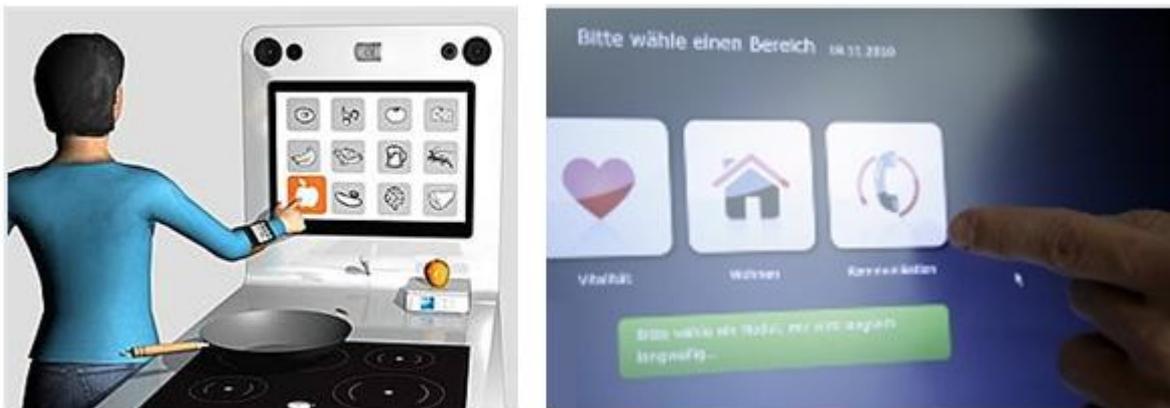


Figure 32- DiaFit project

The most interesting topic about the project is its approach regarding an efficient IT-based diet management. The project's outcome was the development of an innovative multimodal assistant for the nutrition of elderly people in order to evaluate their nutritional behaviour and to individually support them, so both projects have some topics in common. Elderly people were highly involved in processes of system specification and design, as well as user driven evaluation, and because of that in ChefMyself project users' perspective will be also important to define the concept of the system.

There are reports on user interfaces focusing on the tasks related to cooking that are targeted at people with specific impairments. While they are useful references, these may not, however fit the needs of older adults.

Examples of these are reported in the literature:

Tee et al. (2005)³⁷ developed a visual recipe book for people with language impairments. The solution was implemented and tested with real users. The main contribution of the study is a semantic model for cooking instructions. The paper shows that the approach can help people cook more independently. The relation to ChefMyself lies not only in the need to provide clear recipe instructions through a screen, but also on the semantic model itself, that may be useful for the whole system.

³⁶ <http://diafit.fh-joanneum.at/>

³⁷ Tee, K., Moffatt, K., Findlater, L., MacGregor, E., McGrenere, J., Purves, B., and Fels, S. (2005). A visual recipe book for persons with language impairments. In *Proceedings of CHI'05*. ACM, New York, NY, USA, pp. 501-510.

We have also found two papers on recommender systems suggesting meals and meal plans for older adults and/or people with disabilities (Åberg, 2006; Iglesias et al., 2010). These are not, however, as comprehensive as the ChefMyself proposed solution.

The system presented by Åberg³⁸ is described as taking into account seven different aspects for recommending meals and meal plans: taste, cost, preparation difficulty (based on users' skills), dietary diversity, dietary restrictions, nutritional needs and properties, and available food items (within the person's home). In relation to this solution, ChefMyself brings about a great advantage that is the integration of a cooking robot into such recommender system. Furthermore, while Åberg reports a desktop interface, ChefMyself comprises tablet and TV devices beyond the cooking robot. No comprehensive usability studies are described in Åberg's paper.

The study by Iglesias et al. (2010) is called FoodManager³⁹ and describes a recommender system working with the refrigerator and oven, along with the appliances brand Fagor. The solution allows browsing recipes and retrieving shopping lists, and has a database of 40 recipes tagged according to different diseases, preferences, amongst others. The publication describes simple user testing with 10 older adults: participants could perform one task, and appreciated both the menu planner and the menu adaptation to health situation. Accessibility and usability were not thoroughly tested.

Ikeda et al. (2011)⁴⁰ published a paper on a system targeting older adults with dementia. The system provides the users with visual and oral prompts to overcome errors brought by cognitive impairments. The paper, nevertheless, focuses more on the technical challenges of image projection over surfaces on a challenging environment as is the case of a kitchen. The reported testing includes only two adults, which is markedly insufficient.

4.3 Patents

No relevant patents were found regarding user interfaces.

4.4 Standards / Open Frameworks

As per standards, the ISO and IEC organisms offer different libraries of standardized symbols and its related symbol size. These symbols, sometimes with a compulsory use, are designed in order to be read, and well understood by the majority of users, not specifically elderly users. These libraries of symbols are the ones that the manufacturers use on their products.

Continuing our research with more specific symbols or interface approaches for elderly users, we found a document named "Guidelines for designing kitchen appliances for the elderly", by Susan Revan Rave from Auburn University Alabama. This document describes some recommendations for the user interfaces to be used by elderly people. The author has a good approach about elderly people's capabilities and difficulties

³⁸ Åberg, J. (2006). Dealing with malnutrition: A meal planning system for elderly. In *Argumentation for consumers of healthcare Symposium, Argumentation for consumers of healthcare*. AAAI Press, Menlo Park, CA, pp. 1-7.

³⁹ Iglesias, R., Ibarguren, I., Gómez de Segura, N., Ugalde, J., Coello, L., and Iturburu, M. (2010). FoodManager: A cooking, eating and appliance controlling support system for the elderly. In *Proceedings of the 3rd International Conference on Pervasive Technologies Related to Assistive Environments (PETRA '10)*, Fillia Makedon, Ilias Maglogiannis, and Sarantos Kapidakis (Eds.). ACM, New York, NY, USA, Article 38, 6 pages.

⁴⁰ Ikeda, S., Asghar, Z., Hyry, J., Pulli, P., Pitkanen, A., and Kato, H. (2011). Remote assistance using visual prompts for demented elderly in cooking. In *Proceedings of the 4th International Symposium on Applied Sciences in Biomedical and Communication Technologies (ISABEL'11)*. ACM, New York, NY, USA, , Article 46 , 5 pages.

(hand motor and visual) when using their home appliances. She suggests some solutions for rotary knobs, contact switches, and also visual displays. We plan to use part of her guidelines in our user interfaces.

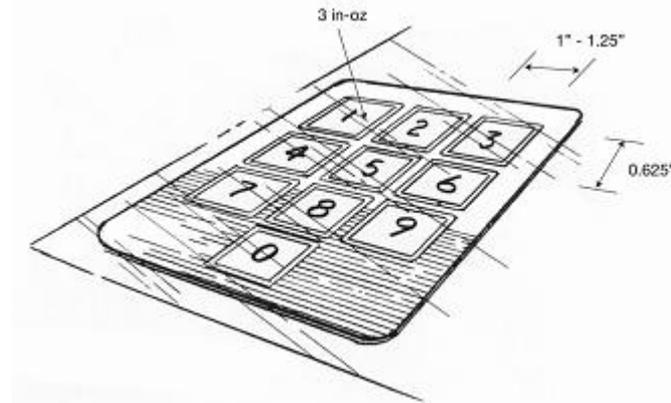


Figure 33- Susan Revan Keyboard size recommendations⁴¹

Even though literature is scarce on guidelines for user interfaces for older adults, some documents provide recommendations and best practices on designing displays for this particular group.

Most common recommendations focus on desktop interfaces, which are nevertheless useful regarding layout or interface architecture principles. Nowadays, due to their proliferation or their use of Cloud services relating different devices, there is an urgent need to extend these studies into mobile devices, an effort which is already being made⁴², but with a particular focus on users with disabilities and older users, so as to improve universal access. In addition, considering the same user, accessibility preferences for a mobile device might be different from those for a personal computer. Regarding best practices in Human-Computer Interaction (HCI) aiming at the inclusion of users with different kinds of abilities—being those derived from impairments, education, age, culture, among others—there have been advances from the first guidelines focusing on font size, spacing, colour and alignment, over multimodality, to the definition of guidelines around patterns for visual elements and interaction. These pattern recommendations for older adults can go as far as defining best screen areas for improved touch accuracy in mobile devices, element spacing, target sizing according to type of target and respective placement, or gesture accuracy across screen areas and according to movement direction⁴³ and are considered fundamental in adaptive interfaces⁴⁴. These advances have recently been boosted by the growing interest on the senior population who is beginning to get familiar with digital technologies, in order to accommodate low digital literacy with ageing decline in sensory, cognitive or motor functions^{45,46}.

⁴¹ http://etd.auburn.edu/etd/bitstream/handle/106415/25/raven_susan_15.pdf?sequence=1

⁴² Peissner, M., Janssen, D. and Sellner, T. (2012). MyUI individualization patterns for accessible and adaptive user interfaces. *Proceedings of SMART 2012: The First International Conference of Smart Systems, Devices and Technologies*: 25-30. Stuttgart: IARIA.

⁴³ Leitão, R. and Silva, P. (2012). Target and spacing sizes for smartphone user interfaces for older adults: design patterns based on an evaluation with users, in *Proceedings of the 2012 conference on Pattern languages of programs*.

⁴⁴ Peissner, M., Schuller, A. and Spath, D. (2011). A design patterns approach to adaptive user interfaces for users with special needs. *Human Computer Interaction. Design and Development Approaches, Lecture Notes on Computer Science*, 6761: 268-277.

⁴⁵ Pak, R. and McLaughlin (2011). *Designing displays for older adults*. Boca Raton: CRC press, Taylor & Francis.

⁴⁶ Fisk, A, Rogers, W. A., Charness, N., Czaja, S. J. and Sharit, J. (2009). *Designing for older adults: Principles, and creative human factors approaches*. Boca Raton: CRC press, Taylor & Francis.

Formal guidelines of the International Organization for Standardization (ISO) may also be found in relation to UIs and HCI. A well-known standard in the field is the ISO 9241-11⁴⁷, which provides a definition of usability and guidance on how to apply usability principles and methods. ISO TR 19765 and ISO TR 19766 contain a survey of icons for people with disabilities and older adults, along with design requirements for these graphical elements. Other source of reference is the W3C, through which we may find guidelines not only for websites and desktop displays, but also some recommendations that specifically address mobile devices. A comprehensive review of relevant standards and recommendations may be found in Bevan (2006)⁴⁸.

4.5 Other approaches

No other relevant approaches on literature were found.

⁴⁷ Preview: <https://www.iso.org/obp/ui/#iso:std:iso:9241:-11:ed-1:v1:en>

⁴⁸ Bevan, N. (2006). International standards for HCI. In C. Ghaoui (Ed.). *Encyclopedia of Human Computer Interaction* (pp. 362-372). Hershey, PA: Information Science Reference.

5. Robot / Food processor

This section focuses on the state of the art regarding cooking robots, or other similar cooking devices, the trends on these appliances in general specially on their capabilities to cook by following a culinary recipe in particular, especially if they are offered with regards to elderly people. Whenever appropriate, it also refers to services related to the robots which may be of relevance for ChefMyself.

5.1 Existing market solutions

- b) Yämmi⁴⁹: This is a very limited kitchen robot from Sonae/Continente, sold in the Portuguese market. The interesting feature is that the users, by using a PC or similar, can get access to a website that contains food preparation recipes. By clicking on these recipes, it is possible to buy the recipe ingredients from them (Sonae/Continente supermarkets) and receive the produce/groceries at home.

It has no co-operation between the robot and the website.

The screenshot displays the Yämmi product page on the Continente website. At the top, there are navigation tabs for 'MÁQUINA & ACESSÓRIOS', 'TOP RECEITAS', 'UTILIZAÇÃO', and 'FAQS'. Below these, there are sub-sections for 'MÁQUINA', 'ACESSÓRIOS DE ORIGEM', and 'ACESSÓRIOS EXTRA'. The main product image is a white and black kitchen robot with a stainless steel bowl. Surrounding the robot are various function labels: 'Mói & Pulveriza', 'Bate em Castelo', 'Pica, Tritura & Corta', 'Emulsiona', 'Amassa & Mistura', 'Aquece & Ferve', 'Coze a Vapor', and 'Refoga & Salteia'. A red price tag indicates 'Preço €349'. To the right, a 'Happy Hour' banner offers 'GANHE 100% DE DESCONTO EM CARTÃO NA TAXA DE ENTREGA DA SUA YÄMMI'. Below the product, there are four circular buttons: 'LIVRO DE RECEITAS', 'TOP RECEITAS EM VÍDEO', 'COMPRA & PAGAMENTO', and 'COMPREI A YÄMMI... E AGORA?'. A red button 'Adicionar ao carrinho' is also visible.

Figure 34 - Yämmi features

⁴⁹ <http://folhetos.continente.pt/online/2013/Yammi/receitas>

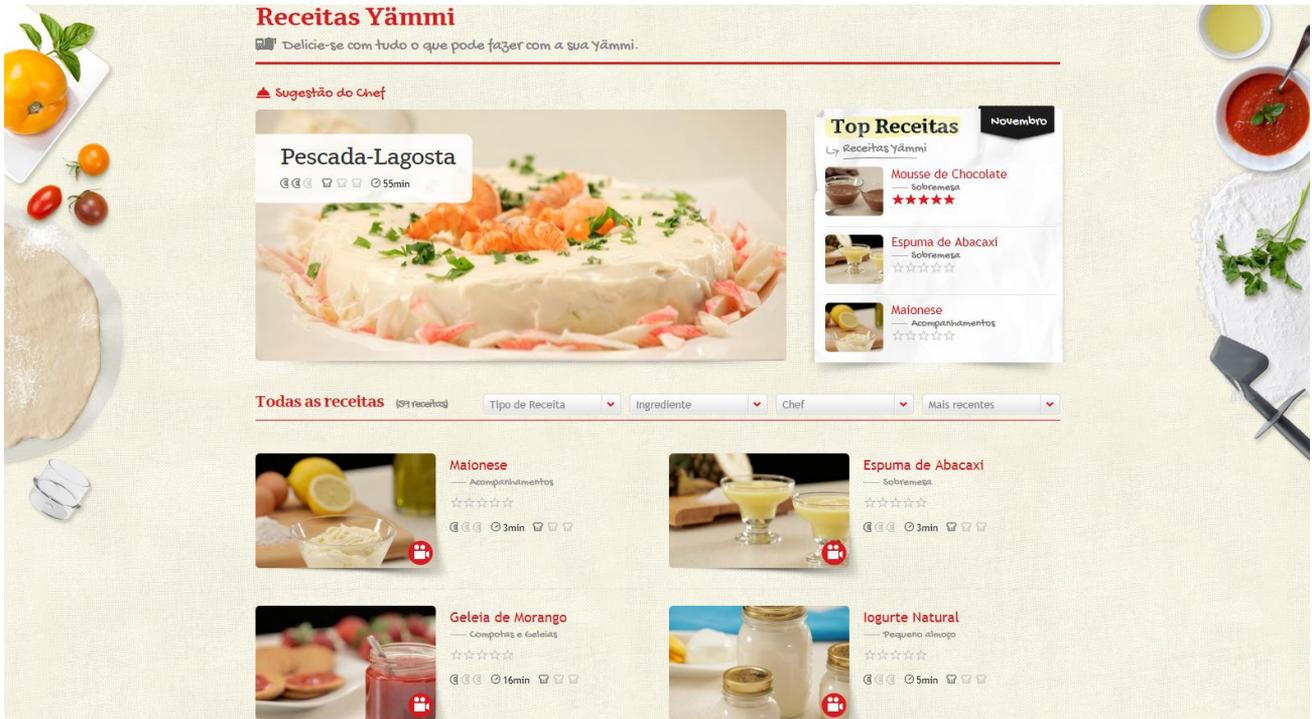


Figure 35 - Offered recipes for Yámmi

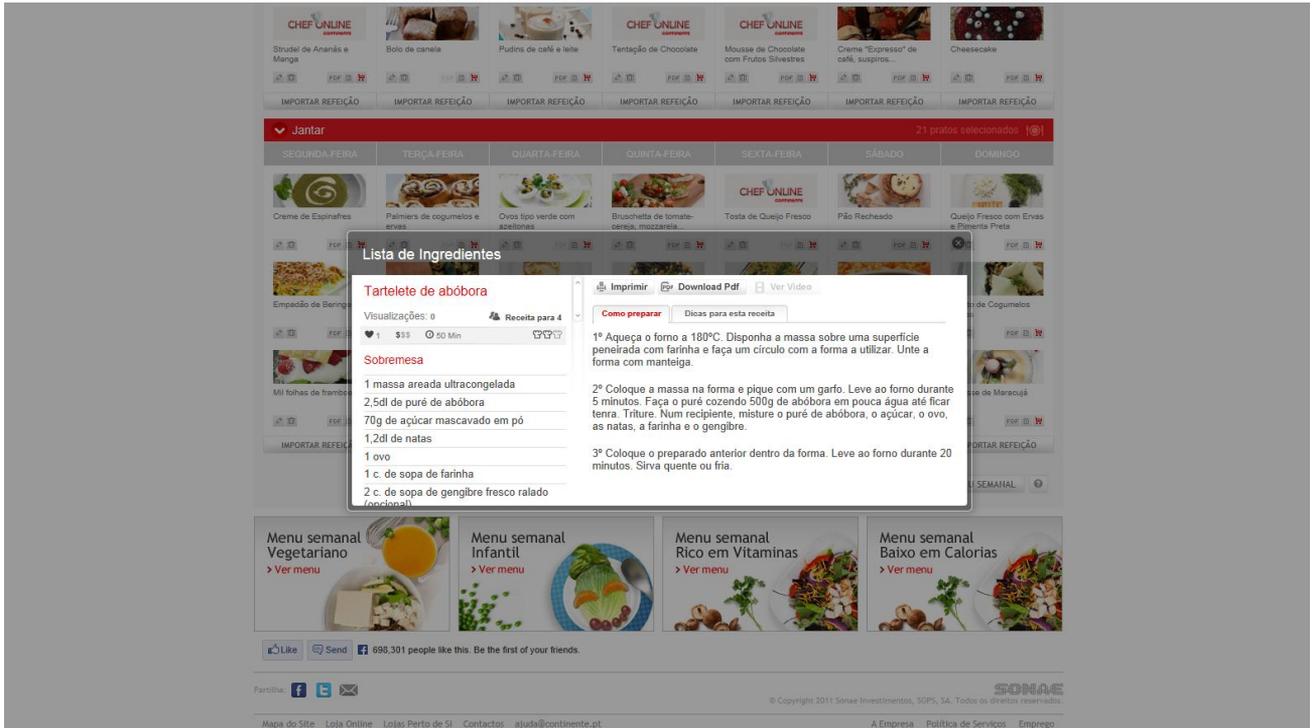


Figure 36 - Recipe preparation on Yámmi product and recipes website

- c) Cookeo⁵⁰: This is a very limited kitchen cooking appliance robot from Moulinex. This is just a pot that integrates a built-in electronic recipes device. It has no stirring or chop functions and the recipes cannot contain more than 6 ingredients. In addition, the recipes cannot be added or edited.



Figure 37 - Moulinex Cookeo

- d) Vorwerk (Thermomix/Bimby)⁵¹: This company is producing kitchen robots, and they have developed a smartphone app that contains a recipe database, this iOS app can help the user to plan a weekly menu and also on the personal shopping list.



Figure 38 - Thermomix device by Vorwerk

⁵⁰ <http://www.moulinex.es/productos/robots-de-cocina/Cookeo.aspx>

⁵¹ <http://www.thermomixapp.com/home>

Thermomix

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By Vorwerk International Mittelsten Scheid & Co.

Open iTunes to buy and download apps.



[View In iTunes](#)

\$8.49

Category: Lifestyle

Updated: 19 September 2013

Version: 1.4

Size: 341 MB

Languages: English, Czech, French, German, Italian, Polish, Portuguese, Spanish

Seller: Vorwerk International Mittelsten Scheid & Co.

© 2011 Vorwerk

International Mittelsten Scheid & Co.

Rated 4+

Compatibility: Requires iOS 6.1 or later. Compatible with iPhone, iPad, and iPod touch. This app is optimized for iPhone 5.

Customer Ratings

We have not received enough ratings to display an average for the current version of this application.

All Versions:

★★★★ 70 Ratings

More iPhone Apps by Vorwerk International Mittelsten Scheid & Co.



Description

The Thermomix App brings you a fantastic new way to cook.

Having this app on your device enables you to plan, shop, prepare and cook your delicious meals quickly and easily.

[Vorwerk International Mittelsten Scheid & Co. Web Site](#) [Thermomix Support](#)

[...More](#)

What's New in Version 1.4

iPhone 5 Adaptions:

The app now fully supports the iPhone 5

[...More](#)

iPhone Screenshots



Figure 39 - Vorwerk product and its app site

- e) Ladymaxx Gourmet (Singer)⁵²: Ladymaxx Gourmet is a cooking robot launched by Singer. As compared to MyCook or Thermomix, this machine is limited. It does not allow steam cooking and it has a 70-100°C temperature range, which limits the range of meals it can prepare. It has a smaller capacity than the other two robots and it does not come with a built-in scale. Furthermore, unlike MyCook, Thermomix or Yämmi, the machine does not have an associated social network where users can engage in discussions about the machine, share recipes and so forth. It has a recipe book as the other examples, but it does not allow, at least for the time being, downloading the recipes from the internet.



Figure 40 - Ladymaxx Gourmet, by Singer

- f) Kimac America TV coverage on easy-to-use home appliances for people with impairments and elderly people. On the lapsed time 0:32 of this video⁵³ the reporters talk about elderly people, their requirements of easy-use, and they display some cooking devices (rice cookers) that presume to achieve this.



Figure 41 - An image of this Kimac America TV video

⁵² <http://www.singer.ag/index.php?id=1018&L=7>

⁵³ <http://www.youtube.com/watch?v=4UUjjHiXNzk>

5.2 Press reports and publications

The most remarkable reports on the topics of interest based on previous experiences that have been found correspond to the development of the AAL (Ambient Assisted Living) Food⁵⁴ project.

“Food” aims to intervene in different activities of daily living related to cooking, feeding and meal preparation/nutrition management. For the purpose it proposes to conduct research and development on the kitchen environment via the use of sensors, intelligent appliances and connection of these devices to the internet. The focus on kitchen appliances probably derives from the involvement of a kitchen appliances company, Indesit

The closest aspect to our ChefMyself project is on the scope of the cooking companion, and perhaps recipes database. However, according to the deliverable documents follow-up, all these activities are not yet developed on this project. Anyway, the cooking companion and cooking assistance seems based on standard videoconference apps such as Skype.

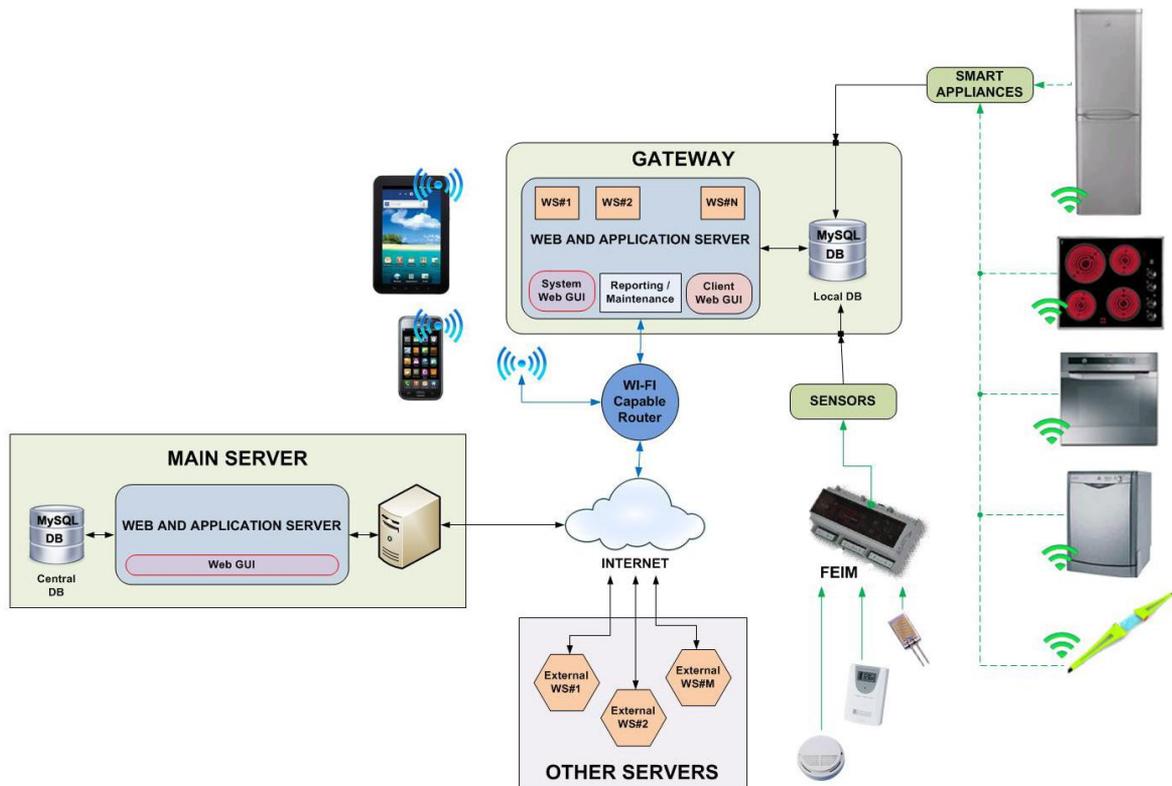


Figure 42 – Food project architecture according to deliverable 3.1

5.3 Patents

- a) Cooking blenders with electronic recipes or network communications
 - Patent WO2011069833 from Vorwerk. This is a cooking appliance with a plurality of electronic recipes, and external device that can keep in communication with this cooking appliance. The

⁵⁴ <http://www.food-aal.eu/>

external device has a movement sensor and, when a specific kind of movement is detected, it presents a recipe rationally or randomly selected from the cooking appliance database. Despite quite amusing a function, it is not intended to be used on this project.

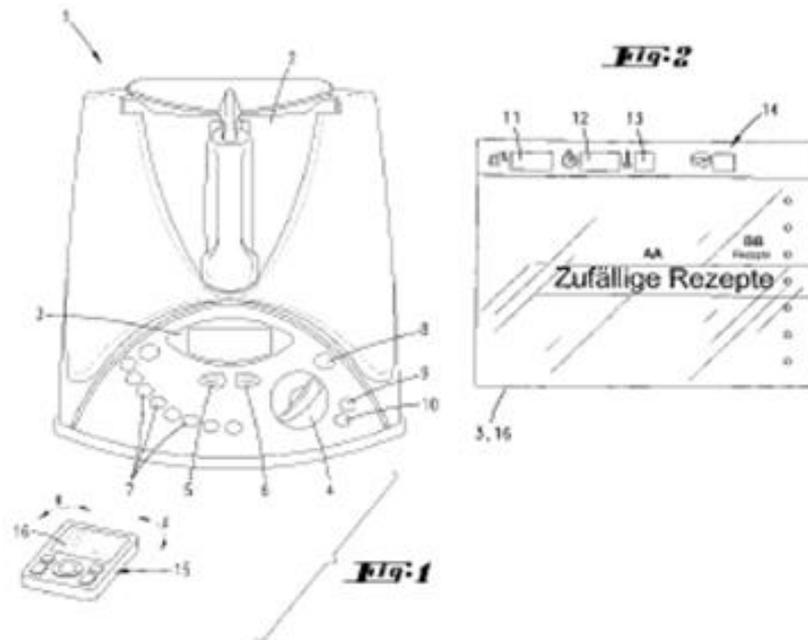


Figure 43 - Product diagram of WO2011069833

b) Other kitchen machines with electronic recipes or network communications

- Patent KR20130023599 from LG describes a network system that by using a remote device connected into a server can select and transmit into the cooking machine a recipe to be processed.

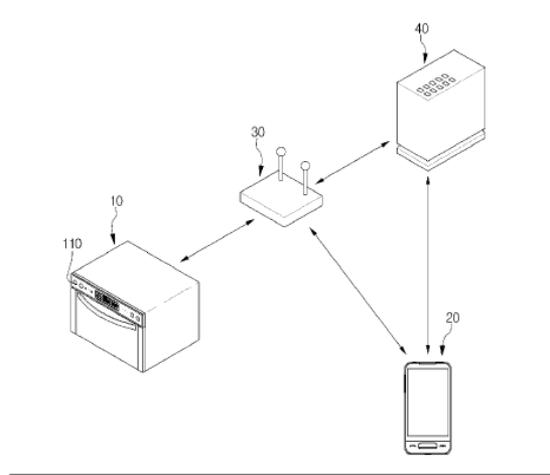


Figure 44 - Communications scheme from KR20130023599

- Patent EP2336642 from Whirlpool describes an oven with a screen user interface that is able to monitor the user on a multi-stage recipe.

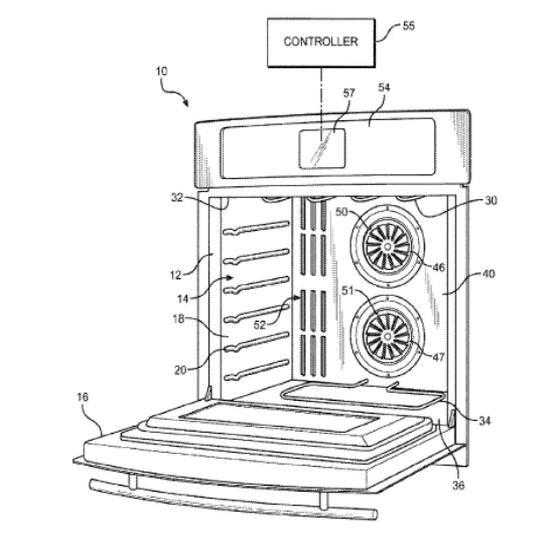


Figure 45 - Communications scheme from EP2336642

- Patent JP2004294864 from Sanyo. It describes a procedure where a home appliance with an electronic food preparation recipes database (including ingredients, utensils...) and a navigation

device, allows the user to get access and process these recipes. In addition, an audio output (voice synthesis) can be generated with the aim to help the user with it.

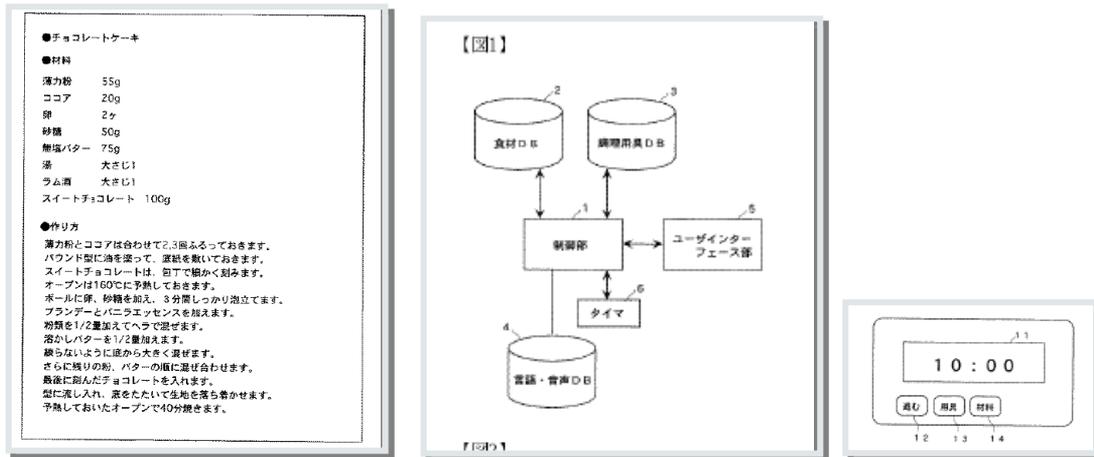


Figure 46 - Recipe displayed, database scheme and user interface from JP2004294864

- Patent JP2006329455 from Toshiba. Relates a procedure for a cooking appliance, which is able to memorize a new recipe, by storing the machine steps and their processing time. They ensure that is easy to manage and not cumbersome, but in our opinion it is quite complex to do. Anyway it is not on the aim of ChefMyself to solely promote new recipes creation and their storage in the system.

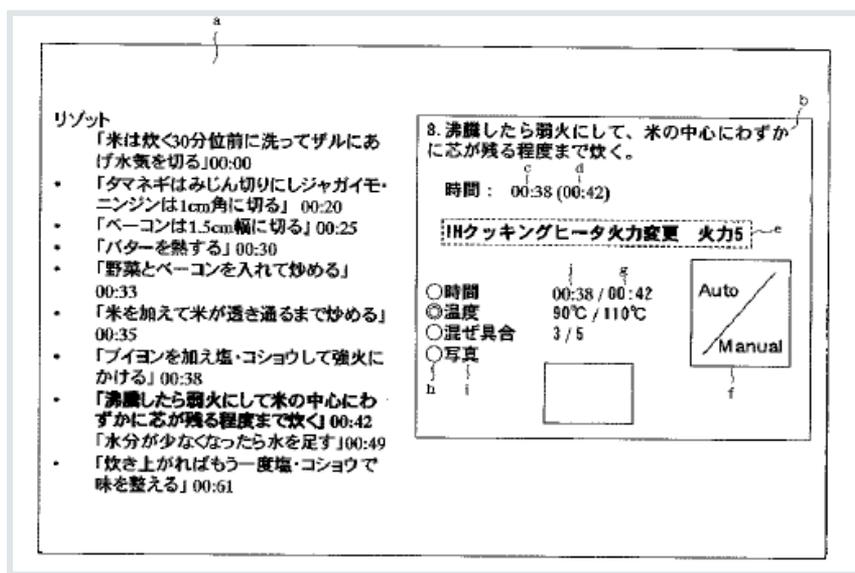


Figure 47 - Recipe displayed once is created according to JP2006329455

Any of the above mentioned patents consider a product to be used by elderly people, and/or describes an equivalent product to ChefMyself purposes.

5.4 Standards / Open Frameworks

The closest prior art on standards was found on the EN50523-1 and EN50523-2 standards. These standards focus on the interworking operations between household appliances, describing the necessary control and monitoring. They define a set of functions of household and similar electrical appliances which are connected together and to other devices by a data network in the home.

Kitchen robots are not included in their scope. We will consider these standards just a guideline.

5.5 Other approaches

It is curious how science fiction has now, as it did many times before (like on Jules Verne novels), anticipate new inventions that will make life easier for humankind, and even in particular for elderly people on the topics related to ChefMyself.

This is the case of the movie “Robot & Frank”⁵⁵, which tells the story of a not too distant future in which the integration of robots into human life will bring programmed androids for eldercare being the solution for Frank, whose memory leaks are becoming more frequent.

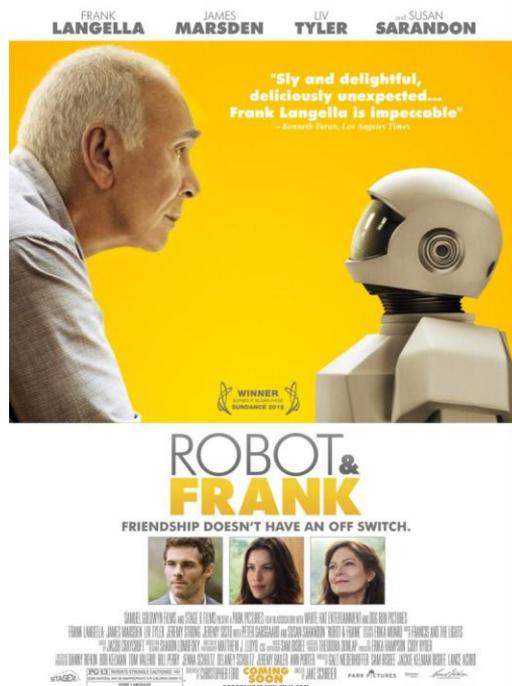


Figure 48 - Frank & Robot movie poster

⁵⁵ Jake Schreier’s Robot and Frank (Robot & Frank). 2012 (Park Pictures, USA). Public award at Sitges Festival 2012.

6. Other peripherals

The ChefMyself system will expose a public API which will make its extension possible. As an example of this extensibility, a Wi-Fi scale will be integrated into the system which will provide information about the user's weight. In this section, the state of the art regarding Wi-Fi scales and other devices that are directly related to nutrition and that can contribute to a better diet planning will be presented.

6.1 Existing market solutions

- FitBit⁵⁶: Consists of a wireless activity tracker and on Aria, a Wi-Fi scale. This scale allows measuring its users' weight, body mass index (BMI) and percentage of body fat, being capable of recognizing up to eight users automatically. The measurements are automatically transmitted to a Cloud and a mobile application is available to control the values and motivate the users with achievements.



Figure 49 - FitBit scale model Aria

- Withings⁵⁷: This has two scales available, the WS-30 which is a simpler scale that measures the weight and BMI and the Smart Body Analyzer which besides that, is able to measure the heart rate and indoor air quality (CO₂ and air temperature). Withings goes beyond the scales, including in its range of products activity trackers, blood pressure monitors and baby monitors.

⁵⁶ <http://www.fitbit.com/uk>

⁵⁷ <http://www.withings.com>



Figure 50 - Withings scale WS-30 and pressure monitor

- **iHealthLabs⁵⁸**: This company has also a deep range of mobile products with the aim to help users on their personal health control, as per example scales and blood pressure monitors, glucose meters, pulse meters, blood oxygen-meter, and then also for fitness purposes such as steps meters, calories burn controllers or distance meters. All able to be connected via Wi-Fi or Bluetooth to a smartphone or similar.



Figure 51 - iHealthLabs scale and blood pressure

All these manufacturers expose a developers' API which can be used, in each case, to integrate the devices with the ChefMyself system.

6.2 Press reports and publications

Health care IT⁵⁹, a specialized North-American magazine on health and new technologies, announced a few days ago that Verizon (America's second largest IT provider) has launched a Cloud service platform that allows clinics to conduct better patients tracking, by collecting patients' biometrics data via wireless devices.



Figure 52 - Verizon's converged health management⁶⁰

⁵⁸ <http://www.ihealthlabs.com>

⁵⁹

http://www.computerworld.com/s/article/9243509/Verizon_launches_cloud_for_sharing_data_from_patient_remote_monitoring_devices

6.3 Patents

PATENT WO2012139121 from Arrhythmia Research Technology Inc. This company discloses a method that can be able to monitor physiological collected data, such as electrocardiogram, blood pressure, respiration, or oxygen concentration, and send this data remotely into a Cloud server via a cell phone or similar.

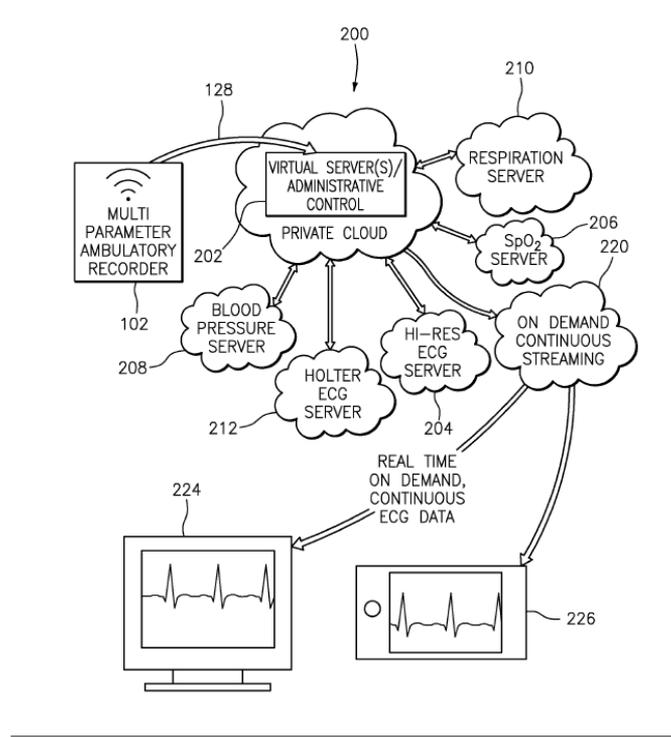


Figure 53 - Arrhythmia Inc, patent diagram

6.4 Standards / Open Frameworks

No standards were found; in fact all companies involved use their own rules and protocols on data transmissions and storage.

6.5 Other approaches

No other approaches were found.

⁶⁰ http://www.youtube.com/watch?feature=player_embedded&v=i_dySd2Fsj0

7. Conclusions

First of all, a methodology to investigate the state of the art for the different technological modules that compose the ChefMyself system was defined. This work was useful to define the way on how the state of the art was going to be carried out. Following this proposed methodology, an assessment of the different considered points of view has been performed. Therefore, the indicated and analysed documents and literature regarding the scope of interest, ensure that the review of the state of the art on the related system modules has been satisfactorily achieved.

There are some solutions available on the market that can be comparable to the proposed ChefMyself solution. Nonetheless, the most important conclusion arising from the state of the art analysis is that the solution proposed by ChefMyself system goes a step beyond the current state of the art. This is because it integrates different technological modules and provides services that conform a holistic approach, which covers all aspects of the user needs, from the content selection and editing features (such as recipe library, functionalities provided by Cloud based web services including diet plan or control) to the food preparation in a kitchen machine.

Summing up, it is clear that the project idea is innovative and beyond the current state of the art, including technological and market trends analysed and compared to the ChefMySelf.

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9. Annex

The following documents have been referenced and are available to be provided for further information in the state of the art of the related topics if necessary:

1. Patent EP2336642 from Whirlpool
2. Patent EP2595098 from Chiao Tung Univ
3. Patent JP2004294864 from Sanyo
4. Patent JP2006329455 from Toshiba
5. Patent KR20130023599 from LG
6. Patent WO2011069833 from Vorwerk
7. Patent WO2012139121 from Arrhythmia