



CELTIC-PLUS/EUREKA Smart Connected World

**Project-ID: C2012/1-1
ACEMIND**



Deliverable D2.1

User and Operator requirements

Contractual Date of Delivery:	<i>28th February 2014</i>
Actual Date of Delivery:	<i>19th February 2014</i>
Editor(s):	<i>Maryline Lebouc</i>
Author(s):	<i>Maryline Lebouc, Olivier Bouchet, Jean-Philippe Javaudin, Marcus Polaczek, Burçak Aytekin, Dimitris Katsianis</i>
Work package:	<i>WP2</i>
Security:	<i>PU</i>
Nature:	<i>Report</i>
Version:	<i>1.1</i>
Total number of pages:	<i>57</i>

Abstract

This document contains an analysis of the feedback received by the end users (customers and operator). This information has been collected during the focus group sessions at Orange and from any others volunteer partners. The document provides recommendations for functions, scenarios and services in WP3 but as well recommendations derived for WP4.

Keyword list

Smart home, end users, operators, feedbacks, expectations, brakes, recommendations, interviews

Executive Summary

This document aims at drawing up a first overview of users and operator requirements regarding the scope of ACEMIND at the beginning of the project. It is divided into two parts in order to depict respectively the expectations on the one hand from a user point of view and on the other hand from an operator point of view.

Regarding the users' requirements, a methodology based on a user centric approach has been used. Fifty five face-to-face individual interviews occurred in three different European countries (France, Germany and Turkey): this represents more than one hundred hours of deepening with people to identify the users' brakes and expectations regarding the scope of ACEMIND project. This approach enables to:

- Validate the interest that users' show regarding the functional scope of Acemind: when people think about their "home in the future", they are looking for smart home, which conciliates ergonomics and high tech, the whole being integrated into a single application
- Refine the functional definition of the services constituting this smart home: at the beginning of the Acemind project, three main services have been defined (Lifestyle, Health and Smart energy) and were thorough during the interviews. These three services were a basis in order to have inputs for the participants so that they can comment and enrich them. Comparing these initial services with the obtained results (§2.4.1.1-Table 5: **Users' expectations regarding "the home in the future" summed up thanks to key words (extract)**)

1.1 European conclusions

This paragraph aims at drawing up all the fundamental users' expectations on a "European" scale. Beyond the questionnaire used during the interviews, this paragraph takes distance in order to sum up these expectations. This paragraph is divided into two parts:

- The first one gives the general European users' expectations, addressing the prerequisites, the expectations themselves and the brakes regarding Acemind scope
- The second paragraph deals with the impacts on ACEMIND project, that is to say what follows from this step of interviews on the initial functional vision of Acemind project.
- **General expectations**, the functional perimeter of Acemind project is consolidated by the users' feedback since all the scope defined initially appears in the general expectations. However, the results of the user's interviews converge to a few adjustments of these three initial services:
 - Lifestyle includes all what people would wish in terms of everyday life related to organization and management of their home. In particular, the interviews emphasize the fact that people would like to remotely manage their house in order to:
 - Monitor all the logistical aspects of the house (lights, curtains, heating, etc.)
 - Program and monitor their electrical appliances (washing machine, etc.)
 - Manage their numerical contents (video, music, etc.) and access to them. The aggregation and the location of the storage of the contents are recurrently seen as an issue

More globally, people would like to manage their entire domestic environment as if they were at home. Some people even think to include the car in this vision.

Lifestyle services are mainly based on a communication from the user to the home (to give order, to manage, etc.)

- Wellness: People are looking for welfare and safety in a house which "looks after" them (danger, intrusion, health), sending them information or alerts if needed. On the contrary to lifestyles services, wellness services are mainly based on a "communication" from the home to the user (to give information, to alert, etc.). This service includes the topics concerning:
 - Detection of danger or breakdowns (frost, smoke, etc.),
 - Intrusion,
 - Reassurance: people would like to have the possibility to check the current status of what concerns them (or worries them) at home,
 - Pleasure: in their "home of the future", the participants also add a dimension of more pleasure and emotions. (For instance, to choose the ambiance in terms of lights and music, to feel more emotions thanks to 3D and bigger screens, etc.).
 - "Health": lastly, for a part of the participants (niche market), some people expect a service against discomfort and health problems and which will be able to alert if they have a problem.

The main target of this "wellness expectation" is to reassure people so that they feel confident in the status of their house. They wish a service that notifies them if something abnormal is happening at home.
- Sustainability: the last service is dedicated to the sustainability and "green" aspects motivated by savings, environmental and health issues (No radiofrequency radiation)
- Identify the key points of the users' expectations (please, see above, the first part of the executive summary) and brakes: the issues regarding are installation, configuration and price remain essential for people
- Establish a first level of appreciation between lifi and wifi: the participants would like ideally technologies which guarantee the absence of impacts on the human being's health. They are inclined to discover new technology (like lifi) but remain very demanding and doubtful regarding the level of quality and the absence of impacts on health of these other new technologies
- List the main expectations of the operators regarding the provision of services to their customers with a satisfactory quality of experience from the installation to the use and refurbish of their home network equipment. Expectations regarding the profitability of the home network are also captured in the document.

Impact on the other Work-packages

The results of this deliverable impact different work packages of the ACEMIND project:

-
- In the WP3, the tasks 3.1 and 3.2, focused on the monitoring and management interface, can be enriched by the obtained results in this analysis, in particular with the adjustments regarding the definition of the three main services and the results regarding the relevancy of logos
 - Likewise, in the WP4, the task 4.1 is focused on the definition of Acemind final demonstrations. Thanks to the results coming from this analysis, the task can orientate the demonstration so that they answer as much as possible to users' and operators' expectations

List of Authors

First name	Last name	Beneficiary	Email address
Burçak	Gündoğdu Aytekin	Arçelik	burcak.aytekin@arcelik.com
Fatih	Kurt	Arçelik	fatih.kurt@arcelik.com
Deniz	Kaya	Arçelik	deniz.kaya@arcelik.com
Ebru	Çetinkaya	Arçelik	ebru.cetinkaya@arcelik.com
Rıdvan	Berberoğlu	Arçelik	ridvan.berberoglu@arcelik.com
Ihsan Mert	Özçelik	Arçelik	mert.ozcelik@arcelik.com
Marcus	Polaczek	Devollo	marcus.Polaczek@devolo.de
Olivier	Bouchet	Orange	olivier.bouchet@orange.com
Jean-Philippe	Javaudin	Orange	jeanphilippe.javaudin@orange.com
Maryline	Lebouc	Orange	maryline.lebouc@orange.com
Dimitris	Katsianis	UoA	dkats@di.uoa.gr

Document History

First name	Last name	Version	Comments
Maryline	Lebouc	V1.0	Creation of the document
Maryline	Lebouc	V1.1	Update of the list of authors

List of Acronyms

Acronym	Meaning
ACEMIND	Advanced Convergent and Easily Manageable Innovative Networks Design
BBF-TR	Broadband Forum – Technical Report
CAPEX	Capital expenditures
FTP	File Transfer Protocol
HGI	Home Gateway Initiative
HNID	Home Network Infrastructure Device
IEEE	Institute of Electrical and Electronics Engineers
QoE	Quality of Experience
QoS	Quality of Service
OPEX	Operating expenses
PLC	Power Line Carrier
WP	Work Package

Table of contents

1	Introduction.....	10
2	Users expectations.....	11
2.1	Methodology and tools.....	11
2.1.1	Methodology.....	11
2.1.2	Tools.....	11
2.2	Analysis by country	13
2.2.1	France	13
2.2.1.1	Lifestyle.....	13
2.2.1.2	Health	16
2.2.1.3	Smart energy.....	17
2.2.1.4	Wifi versus Lifi.....	19
2.2.2	Germany	22
2.2.2.1	Lifestyle.....	22
2.2.2.2	Health	23
2.2.2.3	Smart energy.....	24
2.2.2.4	Wifi versus Lifi.....	25
2.2.3	Turkey	28
2.2.3.1	Lifestyle.....	28
2.2.3.2	Health	30
2.2.3.3	Smart energy.....	31
2.2.3.4	Wifi versus Lifi.....	32
2.3	Comparison between countries.....	35
2.3.1	Comparison service by service.....	35
2.3.1.1	Lifestyle.....	35
2.3.1.2	Health	36
2.3.1.3	Smart energy.....	37
2.3.1.4	Wifi versus Lifi.....	37
2.3.2	Strong convergence in terms of expectations	38
2.4	European conclusions.....	40
2.4.1.1	General expectations	40
2.4.1.2	Users' prerequisites.....	40
2.4.1.3	Expectations	41
2.4.1.4	Brakes	44
2.4.1.5	Impacts on ACEMIND project.....	44
2.4.1.6	Adjustment of the scope of services	44
2.4.1.7	Positioning of the ACEMIND demonstrators	46
3	Operator expectations.....	47
3.1	Meet quality of experience customer expectations	47
3.1.1	Quality of service and quality of experience.....	47
3.1.2	Ease of installation and use	47
3.1.3	User assistance and troubleshooting	48
3.2	Improvement of existing services and deployment of new services.....	48
3.2.1	Existing services	48
3.2.2	New services	49
3.3	Profitability	49
3.3.1	Investment costs (CAPEX).....	49
3.3.1.1	Initial Deployment	49
3.3.1.2	Material renewal.....	49
3.3.2	Operational costs (OPEX).....	49
3.3.2.1	Customer assistance.....	49
3.3.2.2	Maintenance	50
3.3.3	Expected profitability.....	50

4	Conclusion	51
5	Annexes	52
5.1	Toolkit	52
5.1.1	User Interview Guide.....	52
5.1.2	User Interview Questionnaire	52
5.1.3	User Interview Synthesis	52
5.2	Profiles of participants to the interviews	53
5.2.1	France	53
5.2.2	Germany	54
5.2.3	Turkey	55
5.3	Key words given by the participants to sum up their expectations	56
6	References	57

List of Tables

- Table 1: Comparison between France, Germany and Turkey regarding the lifestyle service
- Table 2: Comparison between France, Germany and Turkey regarding the health service
- Table 3: Comparison between France, Germany and Turkey regarding the smart energy service
- Table 3: Comparison between France, Germany and Turkey regarding the smart energy service
- Table 4: Comparison between France, Germany and Turkey regarding Wifi versus Lifi
- Table 5: Users' expectations regarding "the home in the future" summed up thanks to key words (extract)
- Table 6: Adjustments of the initial definition of the services
- Table 7: Profiles of the French participants
- Table 8: Profiles of the German participants
- Table 9: Profiles of the Turkish participants
- Table 10: Comparison of the key words given by the participants of the different countries to sum up their expectations

List of Figures

- Figure 1: illustration used during users' interviews to present the global scope of the Acemind project
- Figure 2: Level of importance attributed by French participants to the remote management of all the logistical aspects and electrical appliances in the house (on a scale of 100)
- Figure 3: Level of importance attributed by French participants to the monitoring aspects at home (on a scale of 100)
- Figure 4: Among these 4 representations, the participants had to evaluate the level of representativeness to illustrate the lifestyle services
- Figure 5: Level of importance attributed by French participants to "health management and monitoring" and the "remote diagnostic and alerts" (on a scale of 100)
- Figure 6: Among these 4 representations, the participants had to evaluate the level of representativeness to illustrate the wellness services
- Figure 7: Level of importance attributed by French participants to the smart energy aspects at home (on a scale of 100)
- Figure 8: Amount (in euros/month) that the French participants (in %) say to be willing to pay for having this service
- Figure 9: Among these 4 representations, the participants had to evaluate the level of representativeness to illustrate the smart energy services
- Figure 10: level of French users' satisfaction regarding the wifi technology
- Figure 11: level of users' satisfaction regarding the wifi technology based on a multi-criteria analysis
- Figure 12: level of importance of several criteria evaluated by the French participants regarding lifi
- Figure 13: Evaluation of the price maximum that French people would be willing to pay for the replacement of Wifi at home
- Figure 14: Level of importance attributed by German participants to the remote management of all the logistical aspects and electrical appliances in the house (on a scale of 100)
- Figure 15: Level of importance attributed by German participants to the monitoring aspects at home (on a scale of 100)
- Figure 16: Among these 4 representations, the German participants had to evaluate the level of representativeness to illustrate the lifestyle services

Figure 17: Level of importance attributed by German participants to “health management and monitoring” and the “remote diagnostic and alerts” (on a scale of 100)

Figure 18: Among these 4 representations, the German participants had to evaluate the level of representativeness to illustrate the health services

Figure 19: Level of importance attributed by German participants to the smart energy aspects at home (on a scale of 100)

Figure 20: Among these 4 representations, the German participants had to evaluate the level of representativeness to illustrate the smart energy services

Figure 21: level of German users’ satisfaction regarding the wifi technology

Figure 22: level of users’ satisfaction regarding the wifi technology based on a multi-criteria analysis

Figure 23: level of importance of several criteria evaluated by the German participants regarding Lifi

Figure 24: Evaluation of the price maximum that German people would be willing to pay for the replacement of Wifi at home

Figure 25: Level of importance attributed by Turkish participants to the remote management of all the logistical aspects and electrical appliances in the house (on a scale of 100)

Figure 26: Level of importance attributed by Turkish participants to the monitoring aspects at home (on a scale of 100)

Figure 27: Amount (in euros/month) that the Turkish participants (in %) say to be willing to pay for having this service

Figure 28: Among these 4 representations, the Turkish participants had to evaluate the level of representativeness to illustrate the lifestyle services

Figure 29: Level of importance attributed by Turkish participants to “health management and monitoring” and the “remote diagnostic and alerts” (on a scale of 100)

Figure 30: Among these 4 representations, the Turkish participants had to evaluate the level of representativeness to illustrate the health services

Figure 31: Level of importance attributed by Turkish participants to the smart energy aspects at home (on a scale of 100)

Figure 32: Among these 4 representations, the Turkish participants had to evaluate the level of representativeness to illustrate the smart energy services

Figure 33: level of Turkish users’ satisfaction regarding the wifi technology

Figure 34: level of users’ satisfaction regarding the wifi technology based on a multi-criteria analysis

Figure 35: level of importance of several criteria evaluated by the Turkish participants regarding Lifi

Figure 36: Evaluation of the price maximum that Turkish people would be willing to pay for the replacement of Wifi at home

Figure 37: Level of importance (in %) attributed by all the participants regarding their expectations in terms of services

Figure 37: Level of importance (in %) attributed by all the participants regarding their expectations in terms of services

Figure 38: Level of interest (in %) attributed by all the participants (French, German, Turkish) to the main topics dealt with the Acemind project

Figure 39: Connection between the 3 services “lifestyle”, “wellness” and “sustainability” and the 5 demonstrators defined in the Acemind project

Figure 40: overall diagnosis architecture proposed by the HGI

Figure 41: European users’ expectations regarding ACEMIND scope

2 Introduction

In the Eureka/Celtic+ framework, the European research project ACEMIND (Advanced Convergent and Easily Manageable Innovative Networks Design), launched in October 2013 for a three years period, aims to simplify the installation and use of intelligent home equipment, regardless of supported technologies. ACEMIND consortium brings together several European industrial players in this market (Orange - FR, OledComm - FR, Devolo - DE, Invea -Tech - CZ, Arcelik - TR) as well as universities and institutes recognized in this area (IHP Microelectronics - DE, University of Athens - GR).

ACEMIND project concept: over single management interface, the user controls his "smart" home. The heterogeneous technologies used are transparent to the user: for him, fridge consumption, light switching, data exchange, etc. are centralized information and available from a single application.

ACEMIND goals are to offer:

- A single, standardized network infrastructure enabling the customer to have a choice in the purchase of equipment and benefit from lower costs.
- Multimedia and smart home products and services on a single network.
- A simple solution for monitoring and management of home network, locally for the user or remotely for the after-sale support service.

To reach these goals, the perimeter of ACEMIND includes an analysis of the point of view of end-users (both users (referring to customers) and operator) in order to identify European end-user's expectations and fears regarding the concepts and the services included in the scope of ACEMIND.

Regarding the users themselves, this analysis is based on a user centric methodology which is divided into three steps:

- Step 1: the inputs, which are the relevant previous results based on users' feedbacks (other projects, internal brainstorming) in order to explore and widen functional aspects within the scope of ACEMIND
- Step 2: the interviews, which are face-to-face and multi-countries, in order to deepen each aspect with European end-users
- Step 3: the synthesis which enables to define users' expectations, to prioritize them, to identify users' brakes and potential specificities according to the countries

Regarding the operator, this analysis is based on the main expectations of the operators regarding the provision of services to their customers with a satisfactory quality of experience from the installation to the use and refurbish of their home network equipment. Expectations regarding the profitability of the home network are also captured in the document.

This deliverable draws up the results of these analyses, both for a user's point of view and for an operator's point of view.

3 Users expectations

3.1 Methodology and tools

3.1.1 Methodology

In order to achieve the task 2.1 of Acemind project, Orange organized user face-to-face interviews: this evaluation was based on a user centric approach and aimed at identifying user's point of view and expectations.

The subject of the evaluation was focused on news functions, news services and news technologies provided for the home network.

In order to have a global vision of user expectations among several countries of Europe and identify specificities according to the countries, the study was achieved by Orange France and by all the voluntary partners

The objectives of the user face-to-face interviews were:

- “Beyond nVoy” (<http://www.nvoy.org/> or 1905.1) to enrich this initial concept and to validate the Acemind concept of service with new functionalities, prioritization of some aspects, etc. (P1905.2)
- “Home automation integration” to validate and prioritize the home automation services for Orange.
- “LiFi extender” to propose and define the specification of new wireless technology alternative to radio (WiFi).

For each country, the users' interviews lasted between 1h30 and 2h00 and followed the same criteria of recruitment¹. The interviews followed the 3 stages mentioned below:

- Welcome and introduction of the subject: presentation of the scope and appropriation of the subject by the participants
- Evaluation step: thanks to the questionnaire and some illustrations, the organizer interviewed people so that they give their point of view about Acemind concepts, functionalities, key points and weak points etc.
- Synthesis: The organizer recapitulated the various tackled subjects so that interviewed people objectively summarize their points of view and put emphasis on their priorities

3.1.2 Tools

In order to have a homogeneous methodology and comparable results, a complete toolkit² was delivered to each country organizing users' interviews. This toolkit was constituted by:

- The methodological guide (English): gives all requirements and prerequisites to put in place the user face-to-face interviews (protocol, recruitment, recommendations, etc.)
- The questionnaire (English): contains all the questions to ask during the interview. This questionnaire deals with the connected home of tomorrow, the home automation services and the LiFi (Light Fidelity) technology versus the Wifi.
- The template for the synthesis (English): enables to summarize the analysis of all the passed interviews

Regarding the questionnaire, several brainstorming sessions were organized before the interviews in order to build it. Thanks to these brainstorming sessions, the main themes of ACEMIND project were identified from a users' point of view with their respective key words (please, see the figure below).

¹ The profiles of recruited people are described in § 0 -

Profiles of participants to the interviews

² Please, see the Annexes (§6) for more details about the toolkit

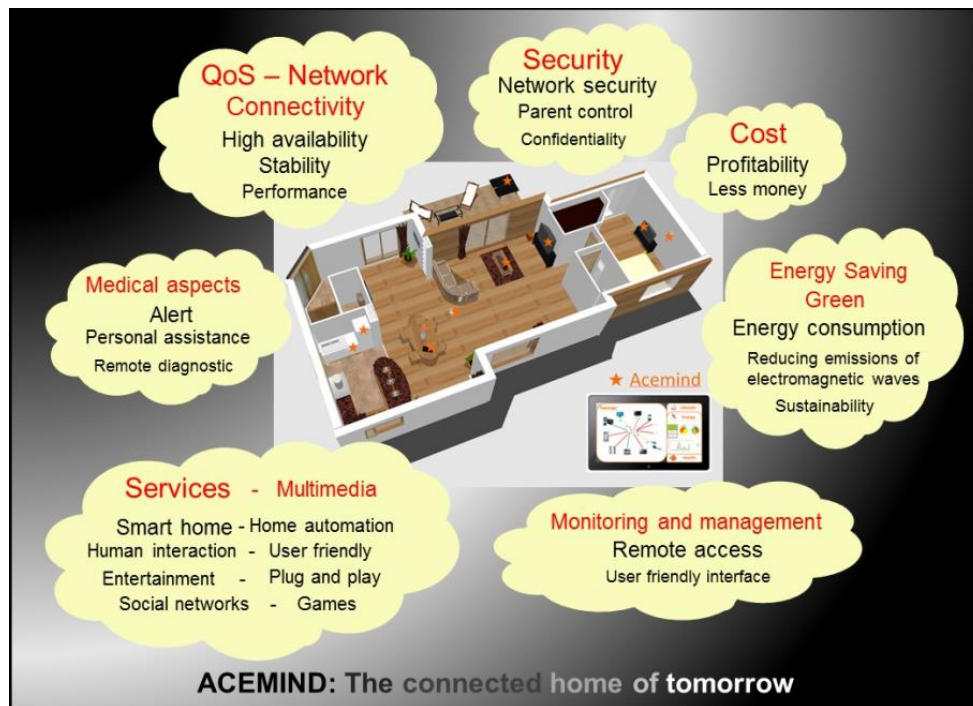


Figure 1: illustration used during users' interviews to present the global scope of the Acemind project
(Illustration built thanks to several brainstorming sessions organized previously the interviews)

Moreover, three services were also defined to be used as inputs during the interviews. These three services were some proposals so that the participants can enrich and deepen them. These services are:

- Lifestyle service, which is focused on:
 - Management of home's equipment and electrical appliances (remotely or not)
 - Monitoring: of home security (intrusion, water flood, etc.)
- Health service, which allows people to monitor if everything is fine with their elder or disabled relatives, at their own home, when they are away.
- Smart energy service, which is focused on the follow and the control (remotely or not) of energy consumption, electrical consumption appliances (white and brown product), optimal management of energy renewal and energy consumption, flatten the home peak consumption and detect electricity breakdowns

Furthermore, the scope of ACEMIND also includes a new technology: the Lifi. As a consequence, the questionnaire also dealt with this subject so that the participants can give their opinion about this new technology in comparison with the Wifi.

All this preliminary work aimed at giving inputs to the participants of the interviews so that they can define their expectations and their brakes regarding ACEMIND project

The following paragraphs present:

- First, the results of these interviews country by country,
- Then globally, a synthesis is achieved including all the countries and draws up the conclusions in terms of users' expectations and brakes

3.2 Analysis by country

For each country, this paragraph gives the detailed results of the interviews service by service. In this paragraph, the services “lifestyle”, “health”, “smart energy” and “Lifi” refer to the description initially defined (please, see §3.1.2)

3.2.1 France

3.2.1.1 Lifestyle

Lifestyle services include initially both the management of home’s equipment and electrical appliances (remotely or not) and the monitoring of home security (intrusion, water flood, etc.)

Regarding the remote management, the level of importance attributed by the French participants is the following:

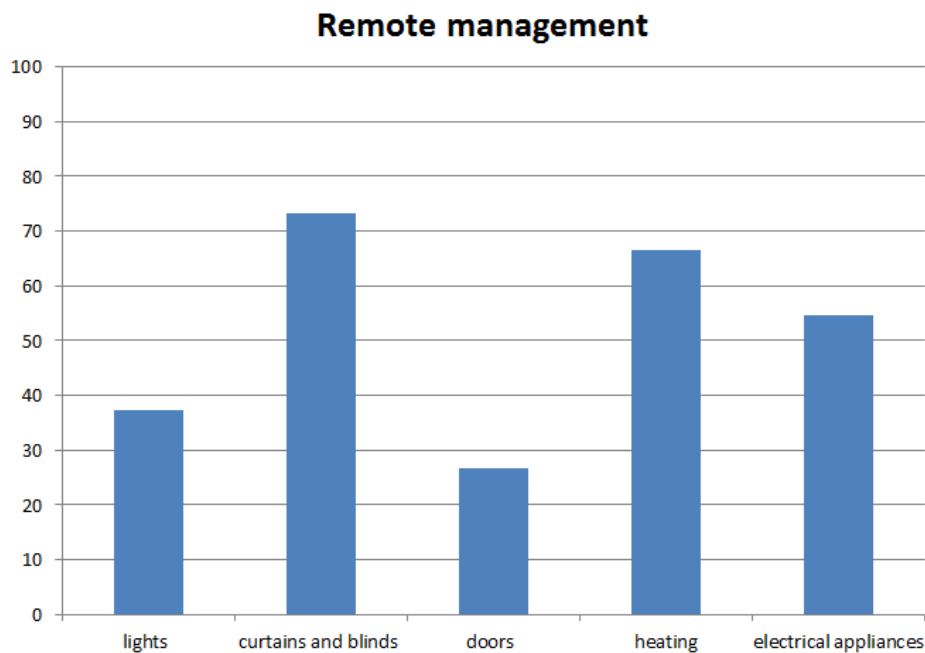


Figure 2: Level of importance attributed by French participants to the remote management of all the logistical aspects and electrical appliances in the house (on a scale of 100)

- Among all the functionalities, the management of curtains and blinds is privileged by people: above all, they associate this functionality to a way of simulating their presence at home. That is why this figure is directly link with a need of security (to make prevention against intrusion).
- Likewise, when the remote management of lights is mentioned by people, this is above all to complete this prevention against intrusion. Otherwise, turn on/off the lights remotely is often considered as unnecessary.
- Regarding the remote opening/closing of doors, people are not globally interested by this possibility: on the contrary, for some of them, they are reluctant because they see a possibility of danger in this functionality (error, intrusion, etc.)
- Regarding the remote management of heating and electrical appliances, the level of importance attributed to them is higher than 50%. The convenience and the comfort are the main mentioned reasons

NB: It should be noted that the remote management takes another dimension for some specific profiles of people. Elder people or with handicap for instance see a way to minimize their level of dependence and to improve their level of autonomy regarding many everyday tasks thanks to the remote management. A French participant defined his need as follow: *“a single user-friendly application accessible for all, whatever is the house, whatever is the person”*

As far as the monitoring is concerned, the level of importance attributed by the French participants is the following:

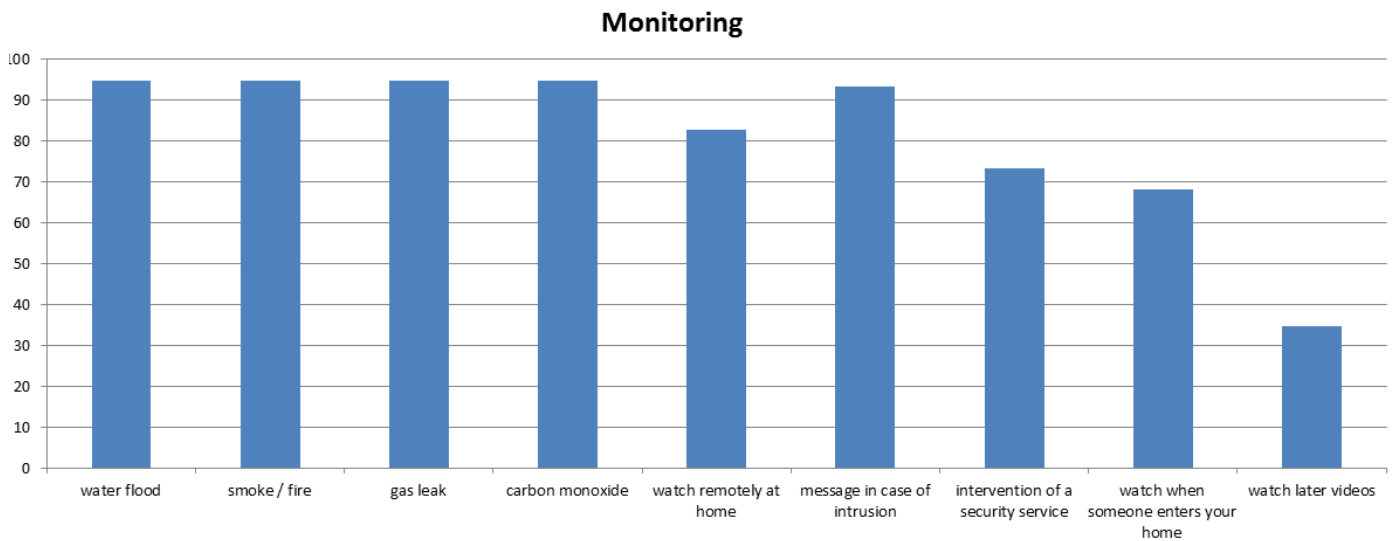


Figure 3: Level of importance attributed by French participants to the monitoring aspects at home (on a scale of 100)

- All the detections of dangers (water flood, smoke, gas leak, carbon monoxide, intrusion) reach a level of importance higher than 90%. All along the interviews, the French participants showed a strong interest in the detection of dangers.
- Regarding the solutions to prevent/remedy an intrusion, French people are divided among the different alternatives (intervention of a security service, watch when someone enters your home, etc.). Among all of them, be able to watch remotely at home remains the most appreciated solution by people. As mentioned in the general users' expectations (§ **Wellness**), the need of reassurance and to know that everything goes well at home remains a priority for the French users.

**96 % of participants say to be willing to pay for this kind of service (lifestyle)
with an average subscription of 21 €/month estimated by these participants.**

The questionnaire used for the interviews also addresses some issues about user interface. Regarding lifestyle services, for each logo below, people had to estimate its level of representativeness of the subject. Here are the results:

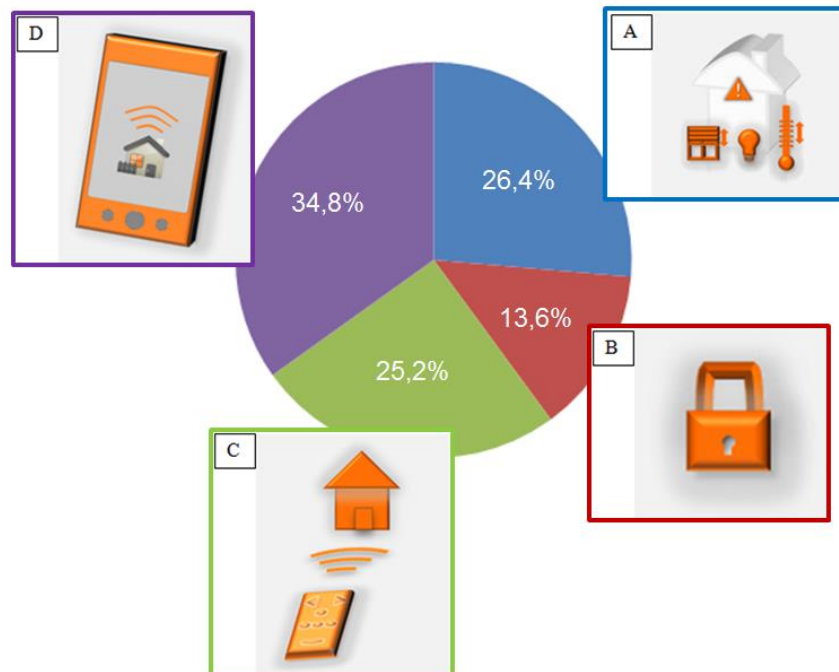


Figure 4: Among these 4 representations, the participants had to evaluate the level of representativeness to illustrate the lifestyle services

These are some complementary comments regarding these logos:

- Logo A: it is too focalized on some aspects. The management of curtains, lights and heating is explicit. On the contrary, the management of electrical appliances is not suggested at all.
- Logo B: it is too focalized on security and locking
- Logo C: the global sense is understood but people consider that the remote control is not up-to-date: the remote management will be done probably thanks to a smartphone
- Logo D: this is the most appreciated logo regarding the remote management.

3.2.1.2 Health

As defined initially, health services allow people to monitor if everything is fine with their elder or disabled relatives, at their own home, when they are away.

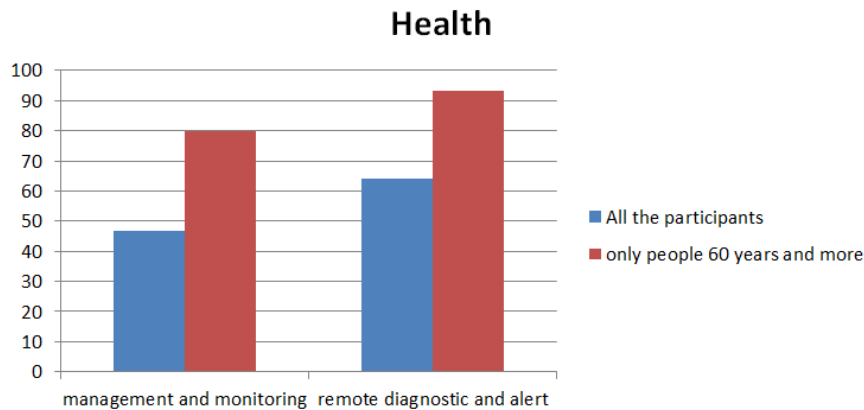


Figure 5: Level of importance attributed by French participants to “health management and monitoring” and the “remote diagnostic and alerts” (on a scale of 100)

In blue, these are the results for all the participants to the interviews (25 people). In red, only the answers of people 60 years and more are taken into account (5 people).

**32% of participants say to be willing to pay for this kind of service (Health)
with an average subscription of 6.50€/month estimated by these participants.**

The level of interest shown by people for this service is really based on their current situation:

- for those who are concerned now: *“If I can stay at home longer thanks to a device/service and feel safely, I will take it.”*, *“This would be really useful for me. In the past, this kind of service would have helped me”*
- for the others, this only remains a “projection”: *“When you begin to have some health problems, this is useful”*, *“this will be useful when I will be older, I do not feel concerned for the moment”*, *“If one day someone of my relatives is concerned, then I will be interested”*

The questionnaire used for the interviews also addresses some issues about user interface. Regarding health services, for each logo below, people had to estimate its level of representativeness of the subject. Here are the results:

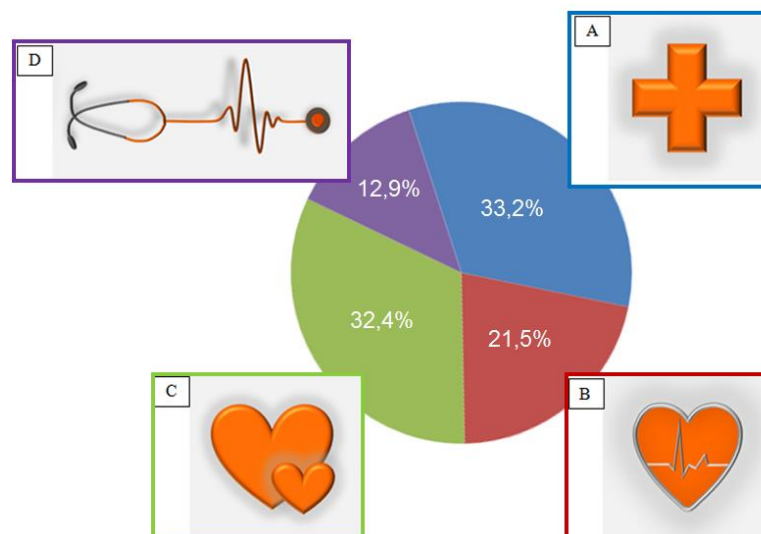


Figure 6: Among these 4 representations, the participants had to evaluate the level of representativeness to illustrate the wellness services

These are some complementary comments regarding these logos:

- Logo A: it is explicit regarding “health aspects”.
- Logo B: too much complicated
- Logo C: it is appreciated. It may introduce other topics (favourites for instance) and is less dedicated on health aspects than the logo A
- Logo D: funny... but complicated

3.2.1.3 Smart energy

As defined initially, smart energy services were focused on the follow and the control (remotely or not) of energy consumption, electrical consumption appliances (white and brown product), optimal management of energy renewal and energy consumption, flatten the home peak consumption and detect the electricity breakdowns.

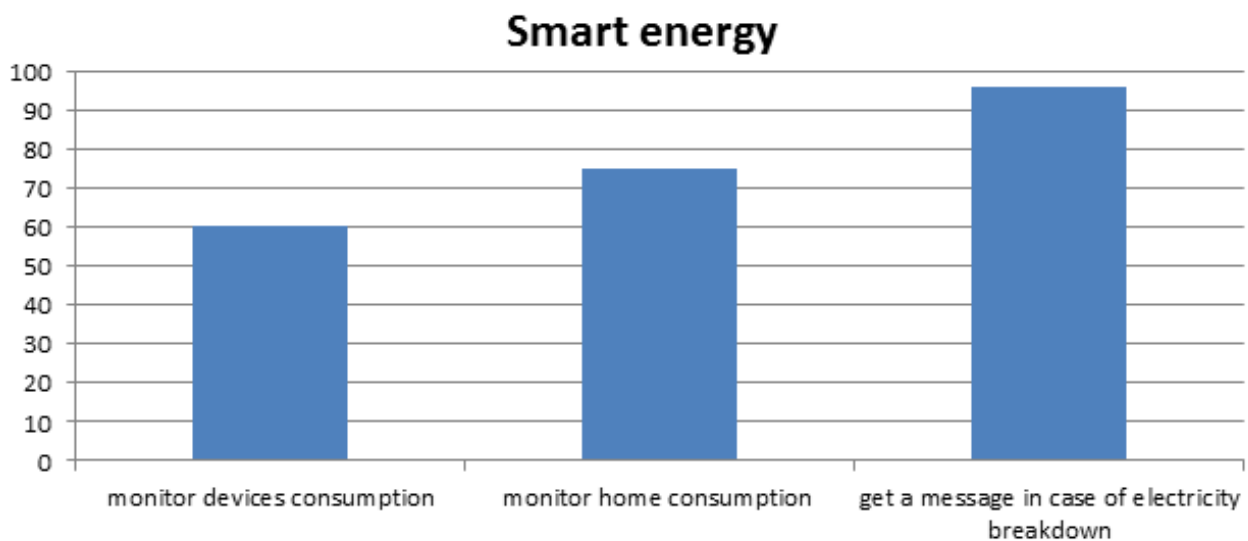


Figure 7: Level of importance attributed by French participants to the smart energy aspects at home (on a scale of 100)

As shown on the figure above, the case of electricity breakdown is identified “fundamental” (96%). As mentioned in the general expectations (§ 3.4.1.3), people propose that all the detections of dangers and breakdowns are grouped together in terms of application and they suggest:

- on one hand, all that concerns breakdowns, dangers, intrusion
- on the other hand, all the data regarding smart energy (historical data, statistics about consumption, etc.)

84% of the participants say to be willing to pay for this kind of service (smart energy) mainly because of the presence of the notification in case of electricity breakdown.

For those who accept to pay to have these service (21 participants on 25), **people say to be willing to pay an average subscription of 3.19€/month with the following distribution:**

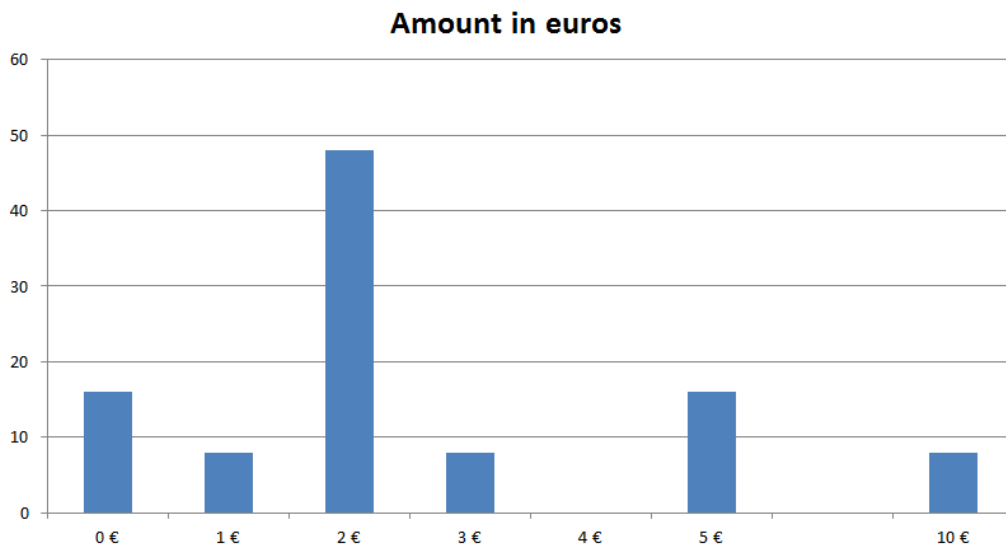


Figure 8: Amount (in euros/month) that the French participants (in %) say to be willing to pay for having this service

The questionnaire used for the interviews also addresses some issues about user interface. Regarding smart energy services, for each logo below, people had to estimate its level of representativeness of the subject. Here are the results:

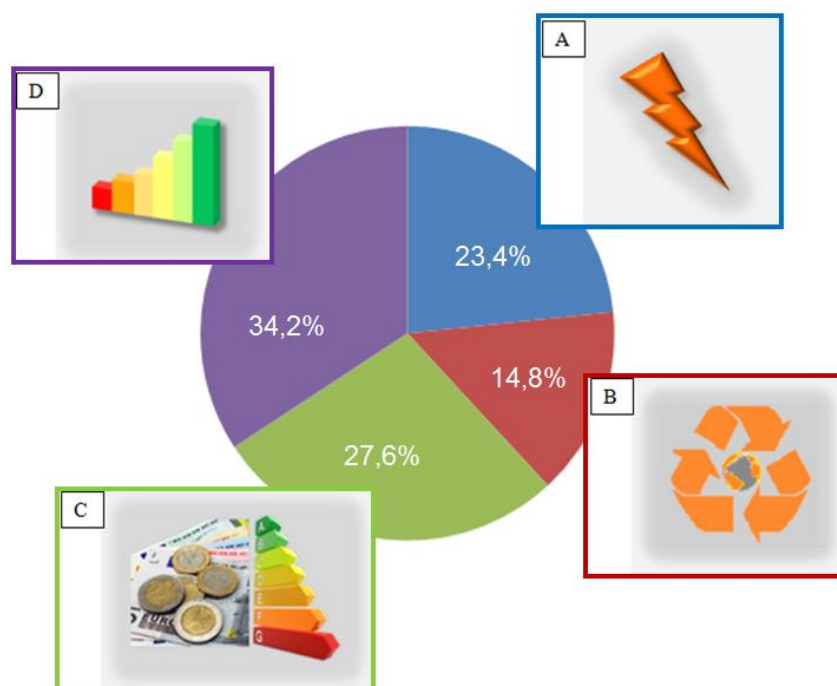


Figure 9: Among these 4 representations, the participants had to evaluate the level of representativeness to illustrate the smart energy services

These are some complementary comments regarding these logos:

- Logo A: it is reminiscent of electricity, but it doesn't suggest neither green services nor energy consumption
- Logo B: too much complicated, not readable
- Logo C: it is appreciated but a little bit more complicated than the logo D
- Logo D: it is appreciated because it is explicit regarding historical data and statistics for the smart energy services

3.2.1.4 Wifi versus Lifi

This part gives the results regarding the users' feedback about the Wifi technology and another alternative: the Lifi.

Globally, people are satisfied by wifi since 96% say to be satisfied or very satisfied (see figure below please).

level of satisfaction regarding wifi

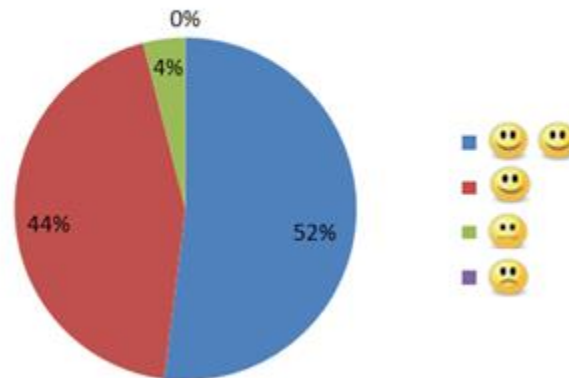


Figure 10: level of French users' satisfaction regarding the wifi technology

Several criteria have been evaluated by the French participants in order to point out the strengths and the weaknesses of this technology. The figure below emphasizes several aspects:

- What the French users plebiscite: the wifi technology is particularly appreciated for installation, ubiquity, convenience and mobility with a level of satisfaction equal to 80% or more.
- What the French users deplore: the main weaknesses of the wifi technology are
 - its security, its speed
 - Radiofrequency radiation (level of satisfaction under 30%)
- Lastly, the French users' opinions are divided as regards the other criteria: expandability, compatibility, cost, range and reliability

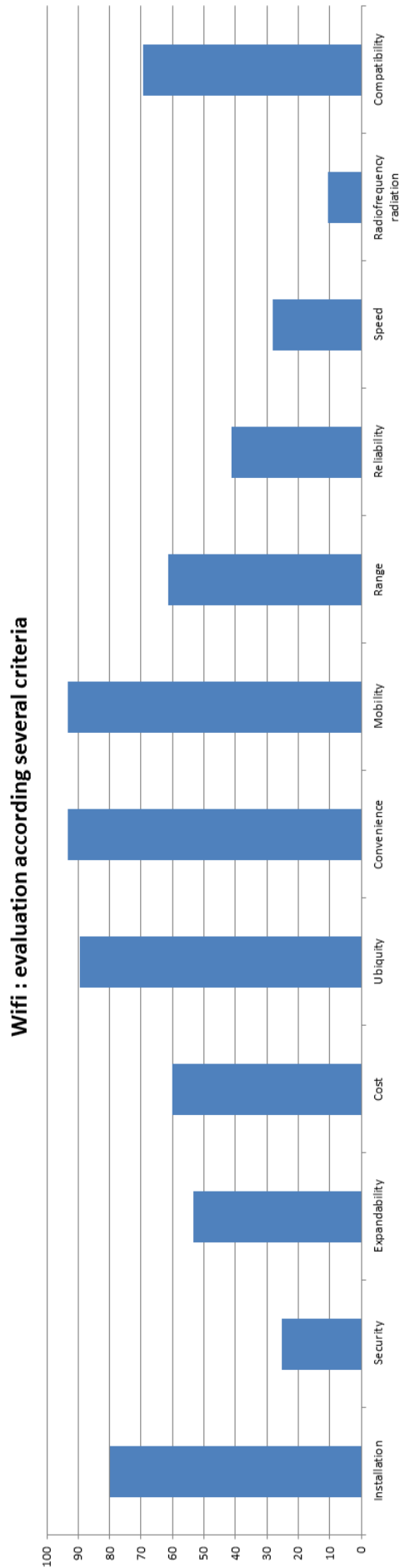


Figure 11: level of users' satisfaction regarding the wifi technology based on a multi-criteria analysis

96% of the participants are interested to learn more about a new technology which could be an alternative to wifi. In order to define the French users' requirements, the level of importance of several criteria was evaluated by people:

Level of importance of criteria for Lifi

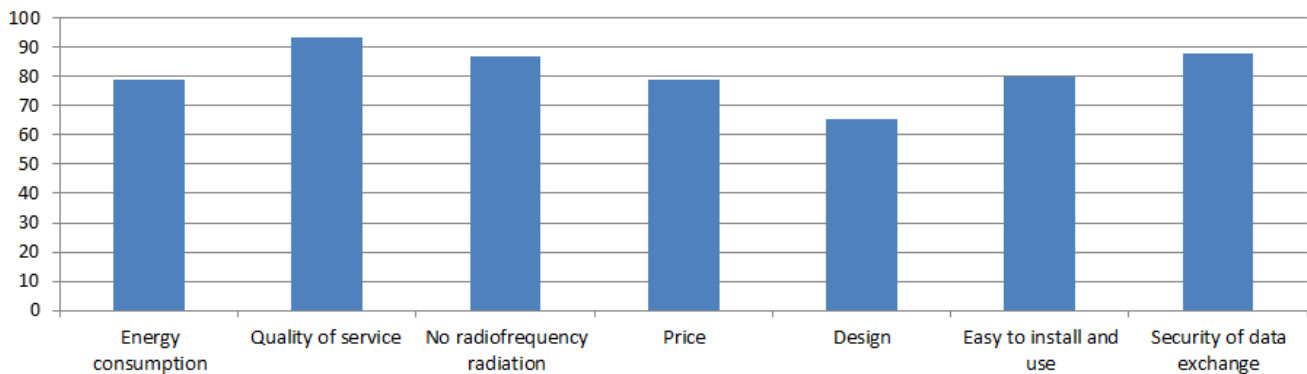


Figure 12: level of importance of several criteria evaluated by the French participants regarding lifi

As shown in the figure above, people are demanding as far as the lifi technology is concerned. Except for some points (security, speed and radiofrequency radiation), people mainly remain satisfied by wifi. As a consequence, supposing they accept to change of technology, they wish among other:

- Retrieve the same level of quality of service. At this stage, people remain doubtful regarding the maturity of the lifi technology. Moreover, wifi is now omnipresent everywhere which is not the case of lifi
- Remedy to the weakness of wifi: security of data exchange and radiofrequency radiation. About this last point, people question if Lifi does not hide other negative health effects
- And, at the same time, have more visibility on the impacts inherent in this new technology. In particular, Lifi impacts both the home and the equipment since it requires a pair of transmitter and receiver. The logistical impact in each room may represent a constraint.

For the replacement of Wifi at home³,

people say to be willing to pay an average invoice of 79 € with the following distribution (25 participants):

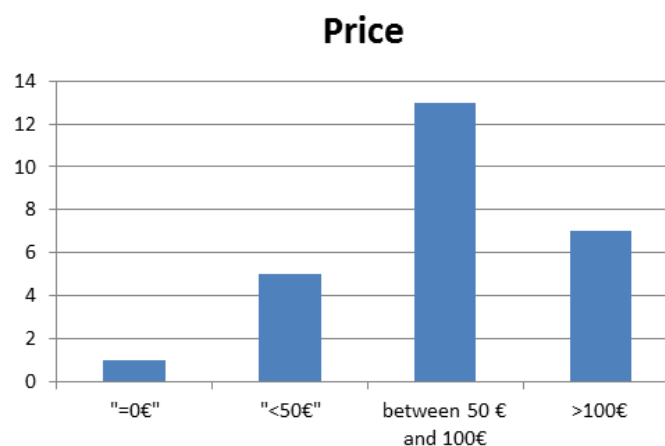


Figure 13: Evaluation of the price maximum that French people would be willing to pay for the replacement of Wifi at home

³ The price of a Wifi extender (about 80€ in France) was given to the French participants for their information.

3.2.2 Germany

3.2.2.1 Lifestyle

Regarding the remote management, the level of importance attributed by the German participants is the following:

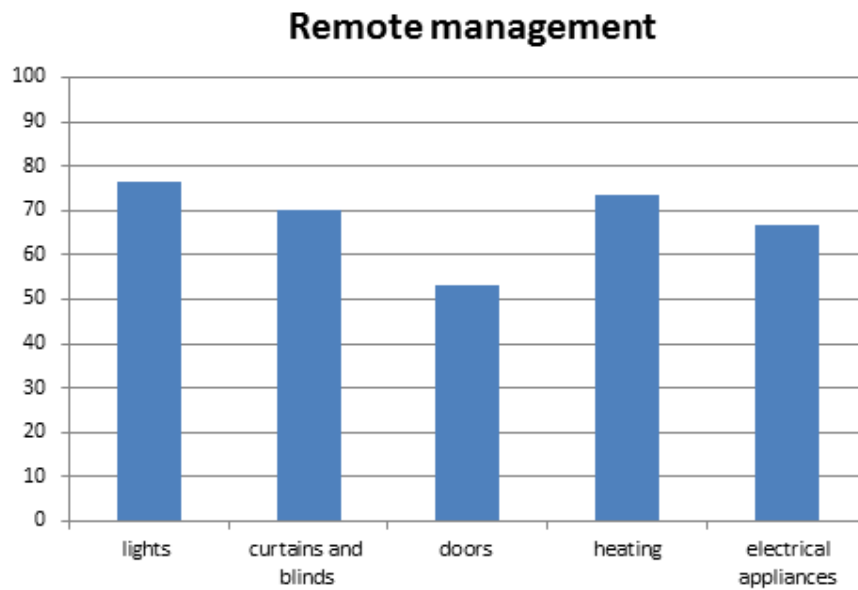


Figure 14: Level of importance attributed by German participants to the remote management of all the logistical aspects and electrical appliances in the house (on a scale of 100)

- Among all the functionalities proposed for the remote management, German people evaluate almost all of them with the same level of importance (around 65%): this is the case for the management of lights, curtains and blinds, heating and electrical appliances
- Only the functionality “remote opening/closing of doors” is less appreciated (level of importance around 50%)

As far as the monitoring is concerned, the level of importance attributed by the German participants is the following:

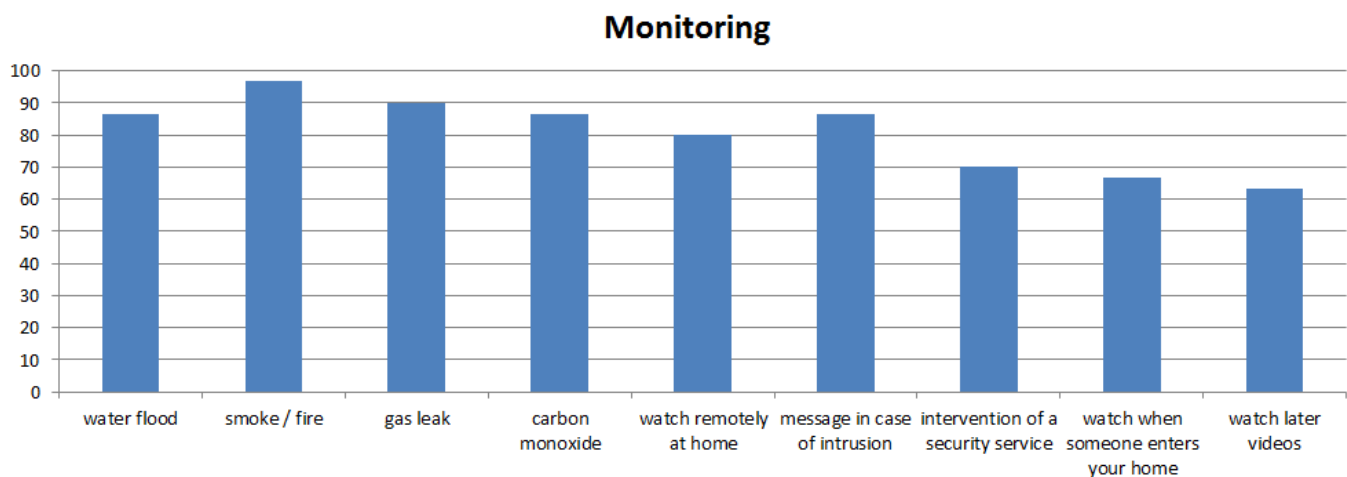


Figure 15: Level of importance attributed by German participants to the monitoring aspects at home (on a scale of 100)

- As it was the case with the French participants, all the detections of dangers (water flood, smoke, gas leak, carbon monoxide, intrusion) reach a level of importance around 90% with the German participants.
- Likewise, the French trend regarding the solutions to prevent/remedy an intrusion also converges to the same trends with the German participants: people are divided among the different alternatives

(intervention of a security service, watch when someone enters your home, etc.). Among all of them, be able to watch remotely at home remains the most appreciated solution by people (80%).

**100 % of participants say to be willing to pay for this kind of service (lifestyle)
with an average subscription of 18 €/month estimated by these participants.**

Regarding the representativeness of the logos to illustrate lifestyle services, the results of German people are the following:

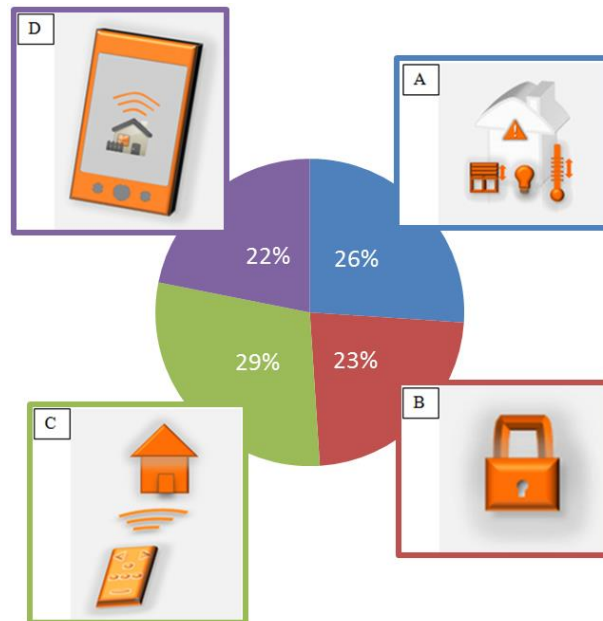


Figure 16: Among these 4 representations, the German participants had to evaluate the level of representativeness to illustrate the lifestyle services

Regarding the logo A, for some people, they consider that it is not clear because of too many icons.

3.2.2.2 Health

Health services allow people to monitor if everything is fine with their elder or disabled relatives, at their own home, when they are away.

As mentioned in the annexes of this document (§ 0), the German participants are between 25 and 46 years old, with an average of 35.5 years old.

Regarding the level of importance attributed to “health management and monitoring” and the “remote diagnostic and alerts”, these are the German users’ results:

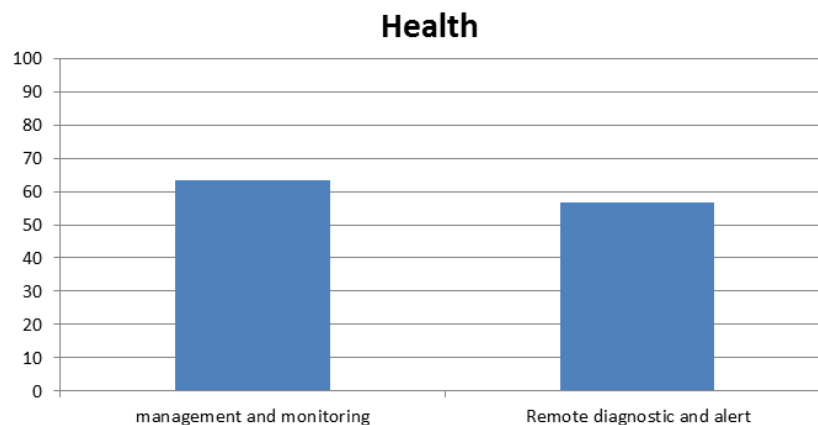


Figure 17: Level of importance attributed by German participants to “health management and monitoring” and the “remote diagnostic and alerts” (on a scale of 100)

**50% of participants say to be willing to pay for this kind of service (health)
with an average subscription of 4.70 €/month estimated by these participants.**

Regarding the representativeness of the logos to illustrate health services, the results of German people are the following:

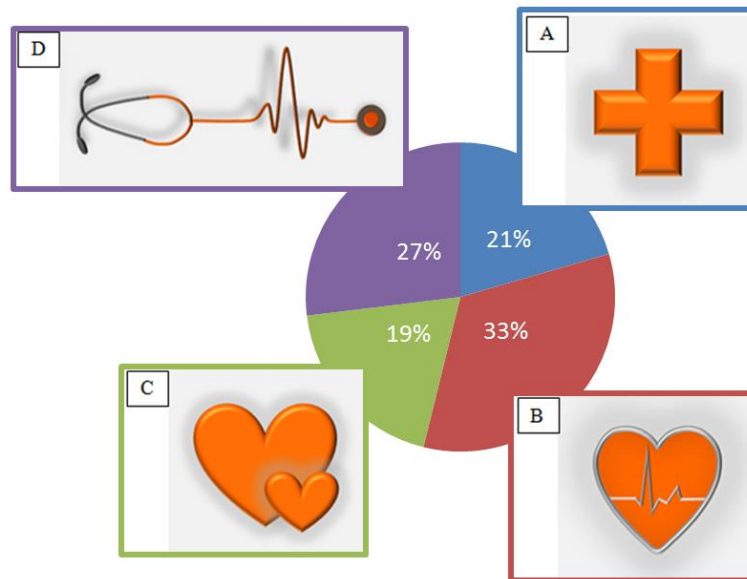


Figure 18: Among these 4 representations, the German participants had to evaluate the level of representativeness to illustrate the health services

3.2.2.3 Smart energy

As defined initially, smart energy services were focused on the follow and the control (remotely or not) of energy consumption, electrical consumption appliances (white and brown product), optimal management of energy renewal and energy consumption, flatten the home peak consumption and detect the electricity breakdowns.

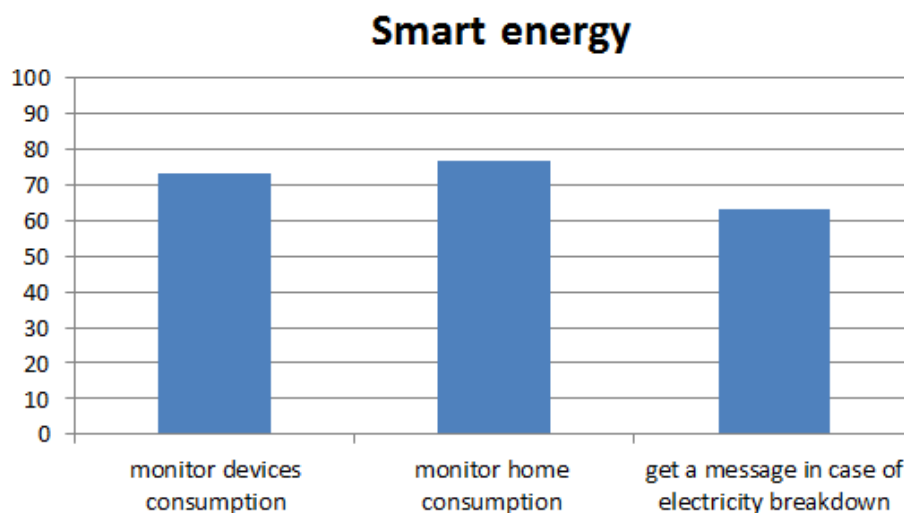


Figure 19: Level of importance attributed by German participants to the smart energy aspects at home (on a scale of 100)

German people globally give the same level of importance to the monitoring of devices consumption, the monitoring of home consumption and the fact to receive a message in case of an electricity breakdown (level of importance evaluated between 60 and 80% for these three functionalities)

80% of the participants say to be willing to pay for this kind of service (smart energy)

with an average subscription of 4.60 €/month estimated by these participants.

Regarding the representativeness of the logos to illustrate smart energy services, the results of German people are the following:

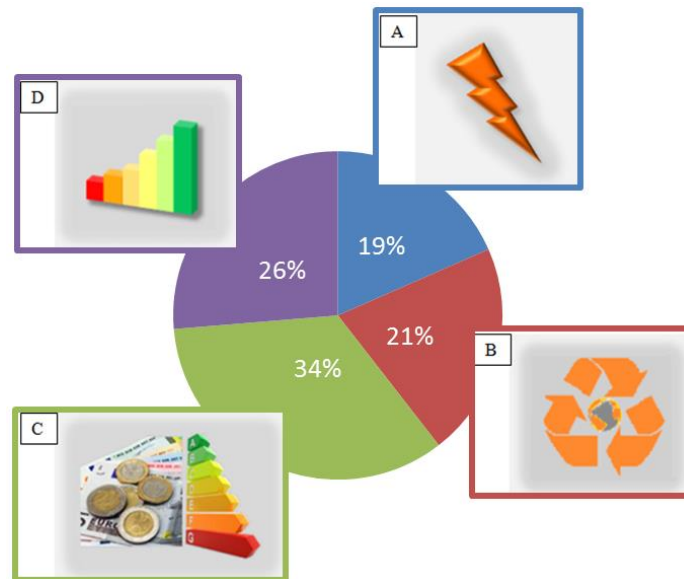


Figure 20: Among these 4 representations, the German participants had to evaluate the level of representativeness to illustrate the smart energy services

3.2.2.4 Wifi versus Lifi

This part gives the results regarding the users' feedback about the Wifi technology and another alternative: the Lifi.

On the contrary to the French participants, the level of satisfaction of the German participants regarding Wifi is not unanimous:

- 50% are satisfied or very satisfied
- 40% are mixed
- 10% are unsatisfied

Level of satisfaction regarding Wifi

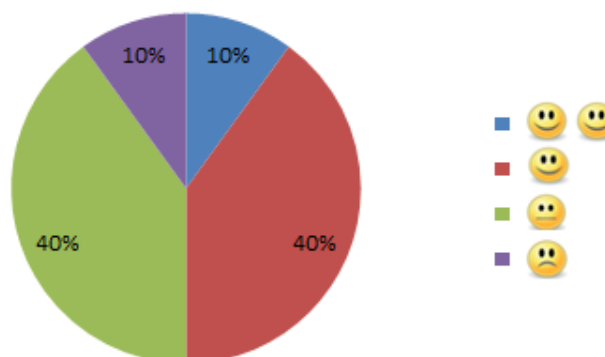


Figure 21: level of German users' satisfaction regarding the wifi technology

Several criteria have been evaluated by the German participants in order to point out the strengths and the weaknesses of this technology.

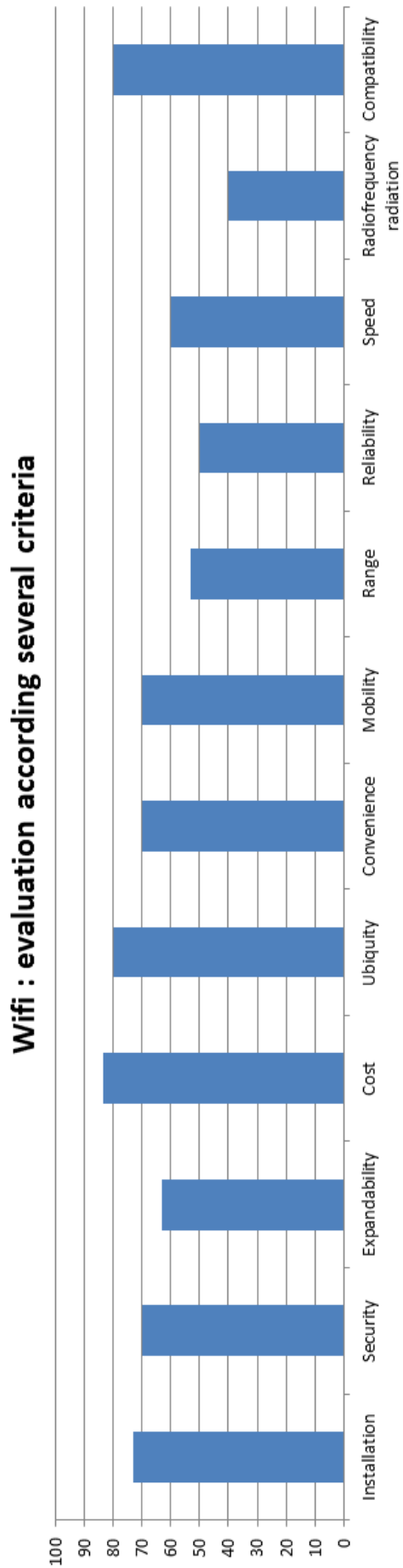


Figure 22: level of users' satisfaction regarding the wifi technology based on a multi-criteria analysis

The figure above confirms that globally, the German users' point of view is more mixed than the French one with intermediate percentages regarding the multi-criteria evaluation of the level of satisfaction. All the percentages are included between 40% and 83% (the gap was between 10 and 93% for the French participants):

- What the German users appreciate with the wifi technology are the following aspects:
 - With a level of satisfaction around 80% or higher: cost, ubiquity and compatibility
 - With a level of satisfaction included between 60% and 80%: installation, security, expandability, convenience, mobility and speed
- What the German users deplore the most with the wifi technology are the following aspects: range, reliability and radiofrequency radiation (this last reaching the smallest percentage of satisfaction with 40%)

50% of the participants are interested to learn more about a new technology which could be an alternative to wifi, whereas 40% don't mind and 10% are totally not interested. In order to define the German users' requirements, the level of importance of several criteria was evaluated by people:

Level of importance of criteria for Lifi

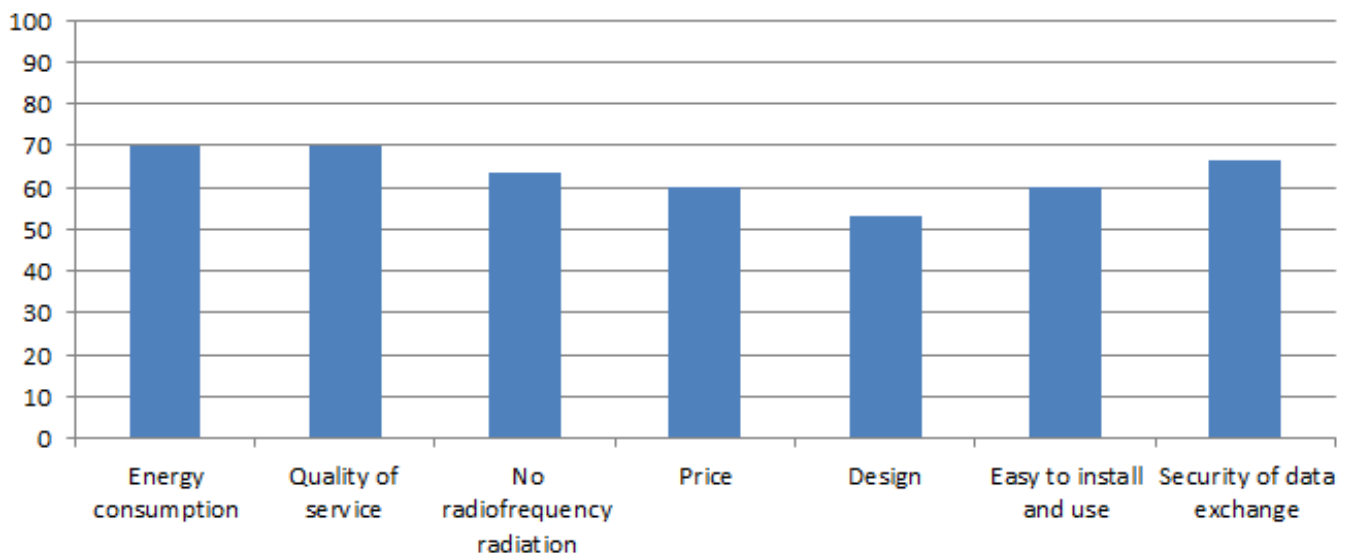


Figure 23: level of importance of several criteria evaluated by the German participants regarding Lifi

As shown in the figure above, the level of importance of all the selected criteria is evaluated between 60% and 70% by the German participants. Only the criteria "design" is a little bit below the whole with a percentage of 53%.

**For the replacement of Wifi at home⁴,
60% of German participants say to be willing to pay
an average invoice of 75 € with the following distribution (10 participants):**

⁴ The price of a Wifi extender (about 80€ in France) was given to the German participants for their information.

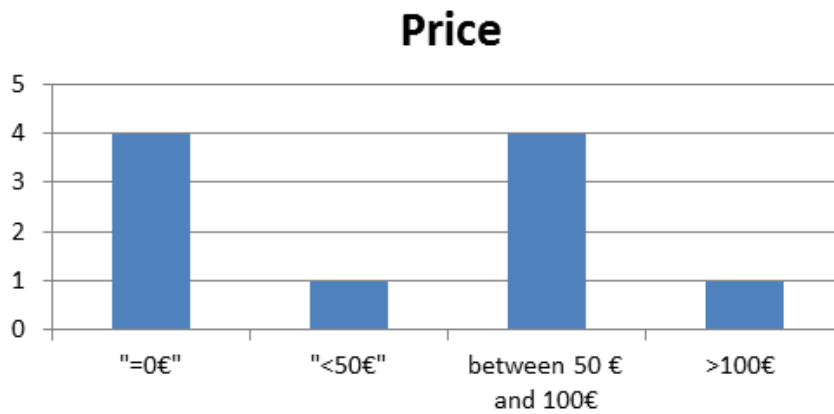


Figure 24: Evaluation of the price maximum that German people would be willing to pay for the replacement of Wifi at home

3.2.3 Turkey

3.2.3.1 Lifestyle

Regarding the remote management, the level of importance attributed by the Turkish participants is the following:

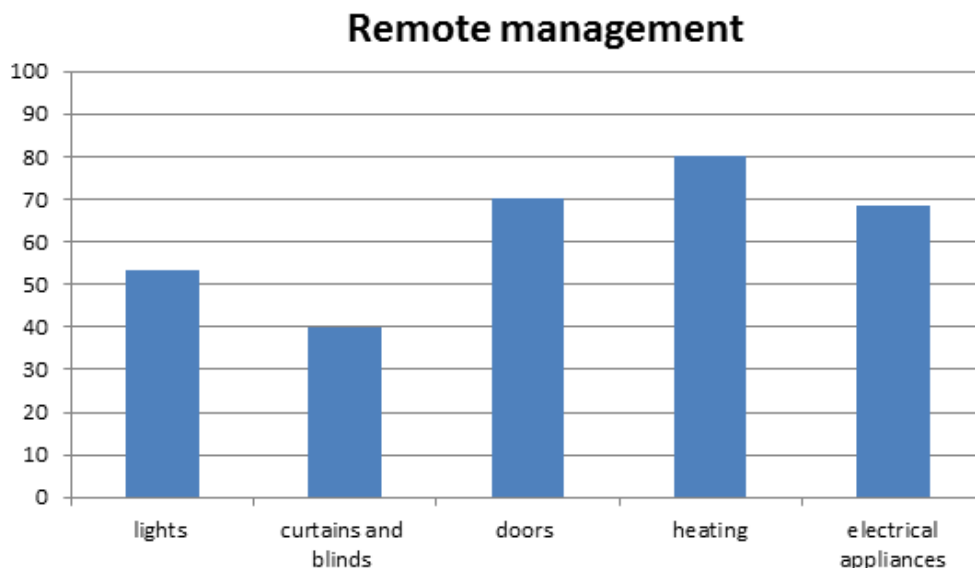


Figure 25: Level of importance attributed by Turkish participants to the remote management of all the logistical aspects and electrical appliances in the house (on a scale of 100)

- Among all the functionalities, the management of heating, the lock/unlock doors remotely and the control of electrical appliances are privileged by Turkish people (with a level of importance around 70% or more)
- The remote control of curtains, blinds and lights are less expected by people (with a level of importance around 50% or less)

As far as the monitoring is concerned, the level of importance attributed by the Turkish participants is the following:

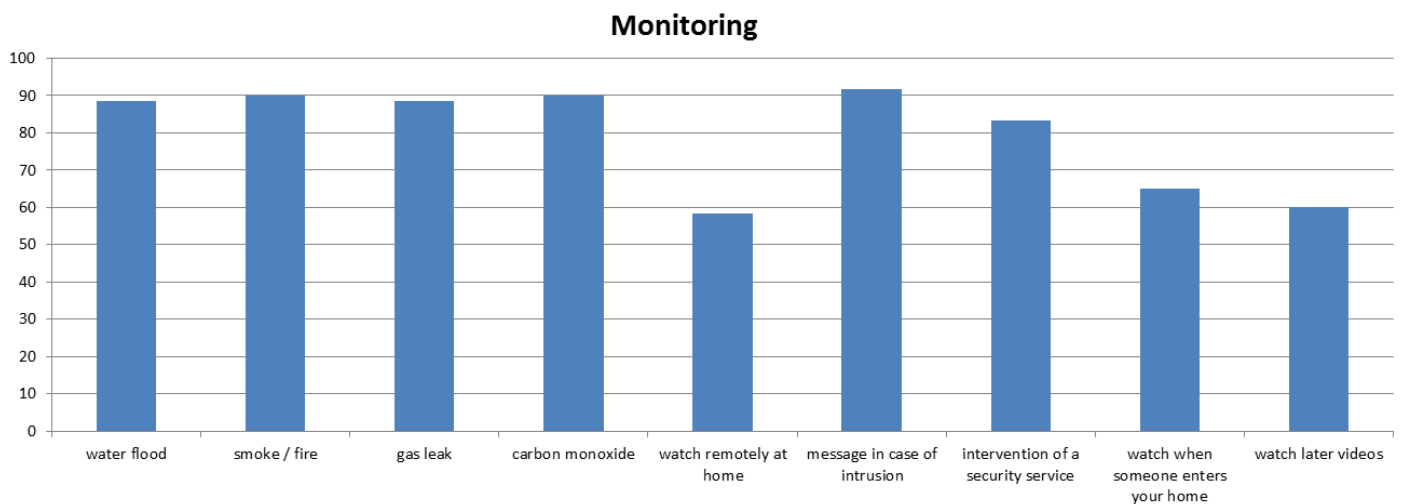


Figure 26: Level of importance attributed by Turkish participants to the monitoring aspects at home (on a scale of 100)

- As this was the case with the French and the German participants, all the detections of dangers (water flood, smoke, gas leak, carbon monoxide, intrusion) reach a level of importance around 90% with the Turkish participants.
- Regarding the solutions to prevent/remedy an intrusion, the Turkish participants privilege the intervention of a security service (around 80%) rather than the other alternatives (watch when someone enters your home, etc.). In particular, for some participants, a home security system which includes cameras may represent a security problem in case of any security leak: “Security is important. I don't want to be watched my home by a stranger people because of a security leak. If there was any doubt about security in this system, I would not buy it definitely”

**90 % of participants say to be willing to pay for this kind of service (lifestyle)
with an average subscription of 38 €/month estimated by these participants.**

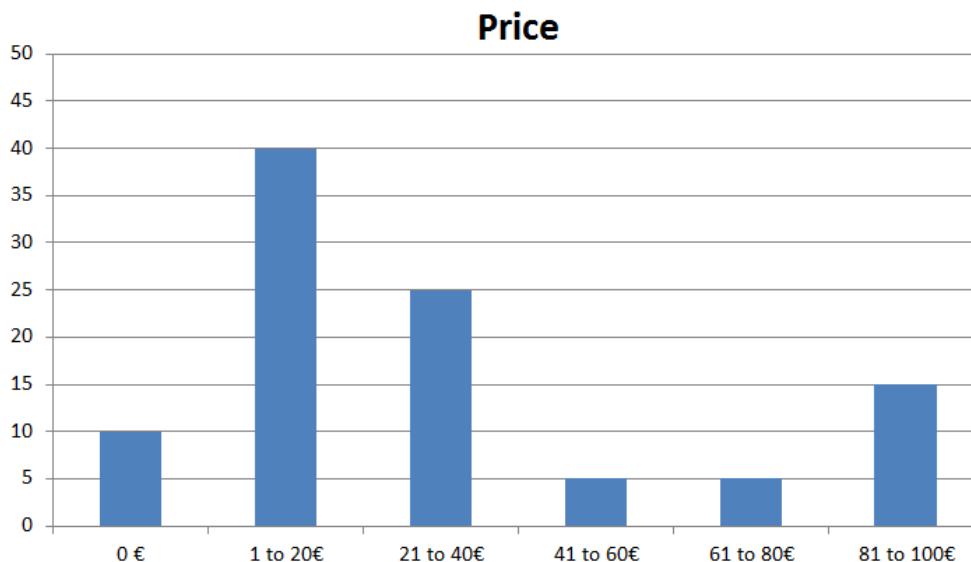


Figure 27: Amount (in euros/month) that the Turkish participants (in %) say to be willing to pay for having this service

Regarding the representativeness of the logos to illustrate lifestyle services, the results of Turkish people are the following:

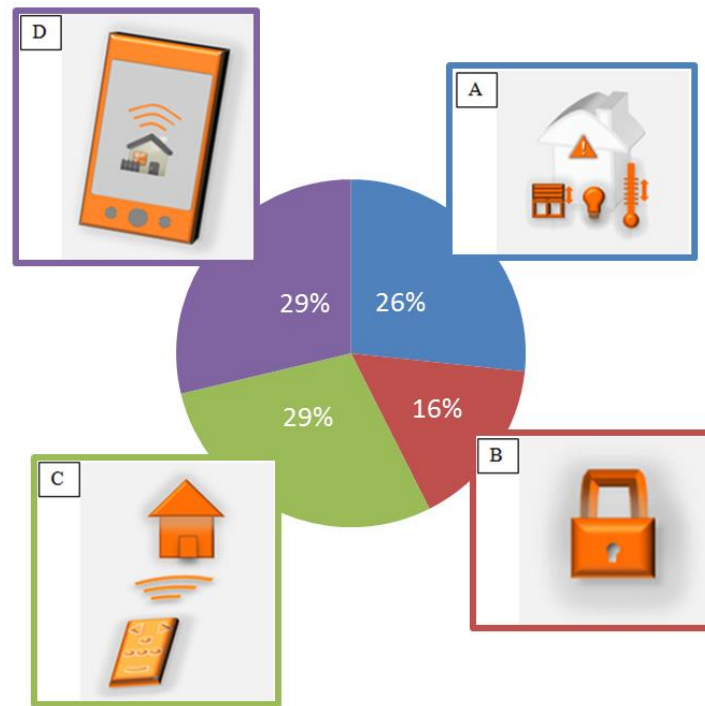


Figure 28: Among these 4 representations, the Turkish participants had to evaluate the level of representativeness to illustrate the lifestyle services

3.2.3.2 Health

Health services allow people to monitor if everything is fine with their elder or disabled relatives, at their own home, when they are away.

As mentioned in the annexes of this document (§ 0), the Turkish participants are between 23 and 54 years old, with an average of 33.3 years old.

Regarding the level of importance attributed to “health management and monitoring” and the “remote diagnostic and alerts”, these are the Turkish users’ results:

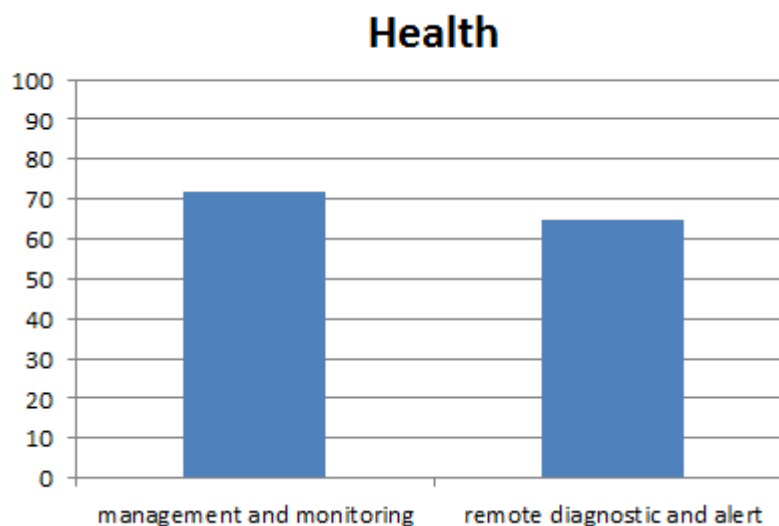


Figure 29: Level of importance attributed by Turkish participants to “health management and monitoring” and the “remote diagnostic and alerts” (on a scale of 100)

**55% of participants say to be willing to pay for this kind of service (health)
with an average subscription of 15.60 €/month estimated by these participants.**

Regarding the representativeness of the logos to illustrate health services, the results of Turkish people are the following:

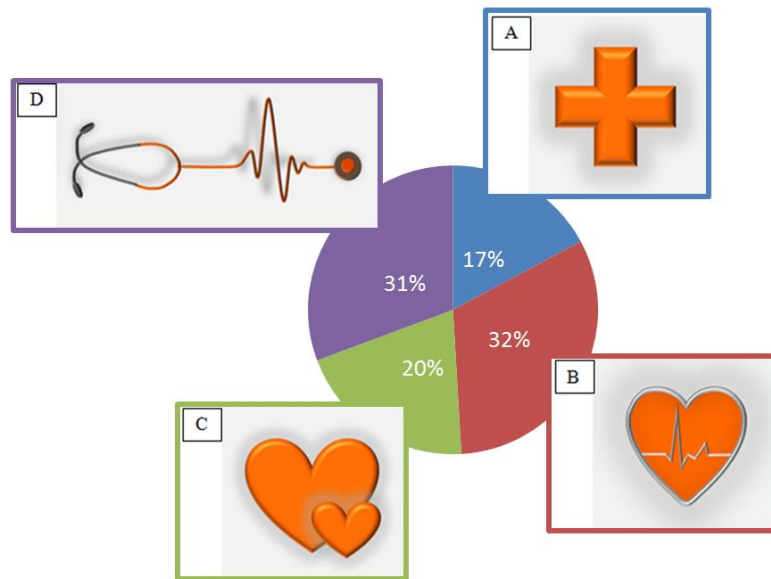


Figure 30: Among these 4 representations, the Turkish participants had to evaluate the level of representativeness to illustrate the health services

3.2.3.3 Smart energy

As defined initially, smart energy services were focused on the follow and the control (remotely or not) of energy consumption, electrical consumption appliances (white and brown product), optimal management of energy renewal and energy consumption, flatten the home peak consumption and detect the electricity breakdowns.

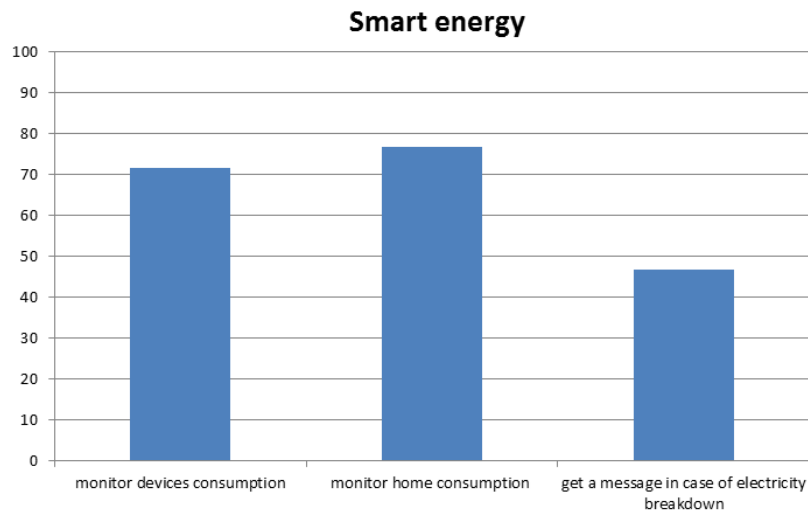


Figure 31: Level of importance attributed by Turkish participants to the smart energy aspects at home (on a scale of 100)

- Likewise for the German people, the Turkish participants globally give the same level of importance to the monitoring of devices consumption and the monitoring of home consumption (around 70%)
- Contrary to France and Germany, the level of importance attributed to the fact to receive a message in case of an electricity breakdown is under 50% (whereas it reaches respectively 96% in France and 63% in Germany).

60% of the participants say to be willing to pay for this kind of service (smart energy) with an average subscription of 11.80 €/month estimated by these participants.

Regarding the representativeness of the logos to illustrate smart energy services, the results of Turkish people are the following:

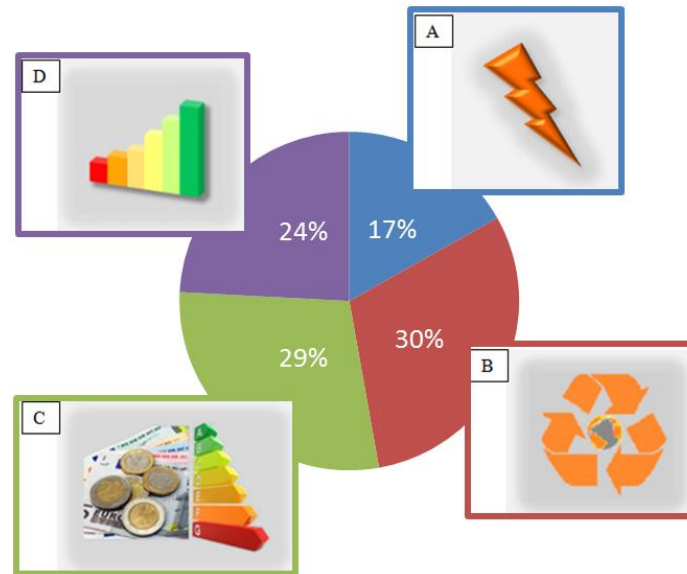


Figure 32: Among these 4 representations, the Turkish participants had to evaluate the level of representativeness to illustrate the smart energy services

3.2.3.4 Wifi versus Lifi

This part gives the results regarding the users' feedback about the Wifi technology and another alternative: the Lifi.

Globally, people are satisfied by wifi since 75% say to be satisfied or very satisfied (see figure below please).

level of satisfaction regarding wifi

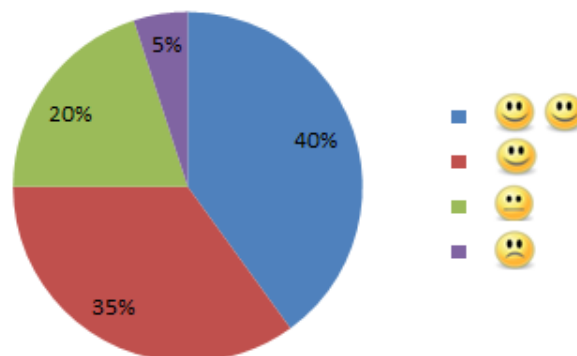


Figure 33: level of Turkish users' satisfaction regarding the wifi technology

Several criteria have been evaluated by the Turkish participants in order to point out the strengths and the weaknesses of this technology. The figure below emphasizes several aspects:

- A set of criteria which the level of satisfaction is high (more than 70%): ubiquity, convenience, mobility and compatibility
- A set of criteria which level of satisfaction is intermediate (around 50 and 60%): installation, security, expandability, cost, reliability and speed
- Lastly, two criteria have a level of satisfaction lower than the others: range (45%) and radiofrequency radiation (30%)

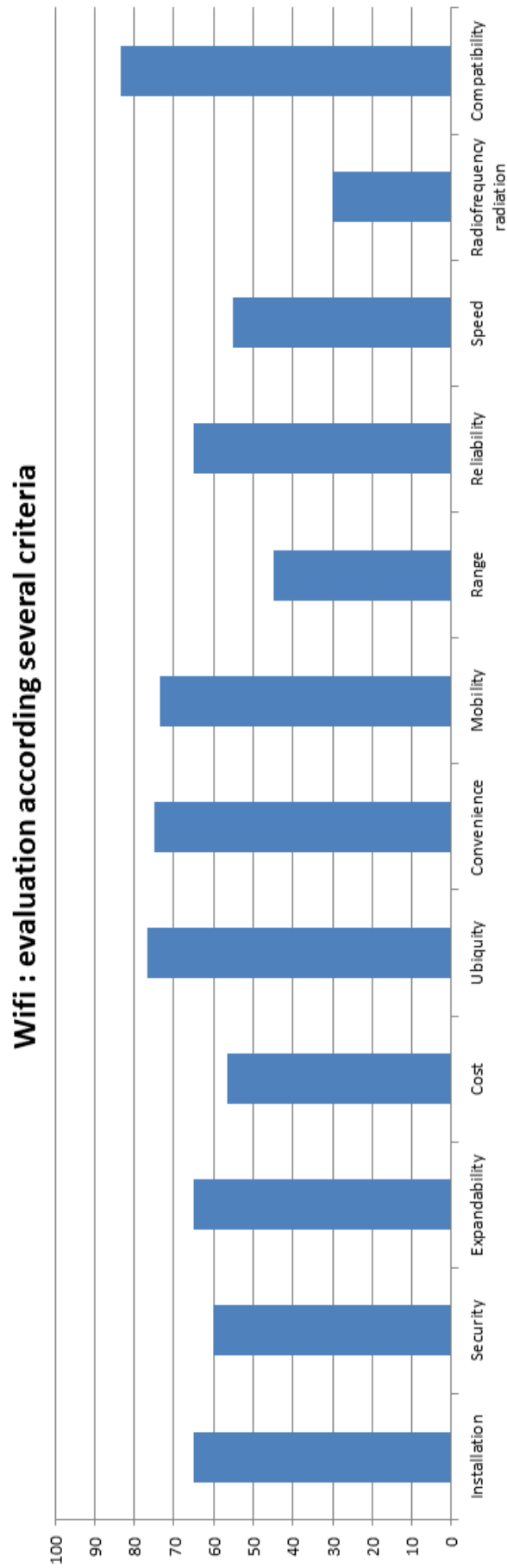


Figure 34: level of users' satisfaction regarding the wifi technology based on a multi-criteria analysis

90% of the Turkish participants are interested to learn more about a new technology which could be an alternative to wifi. In order to define the Turkish users' requirements, the level of importance of several criteria was evaluated by people:

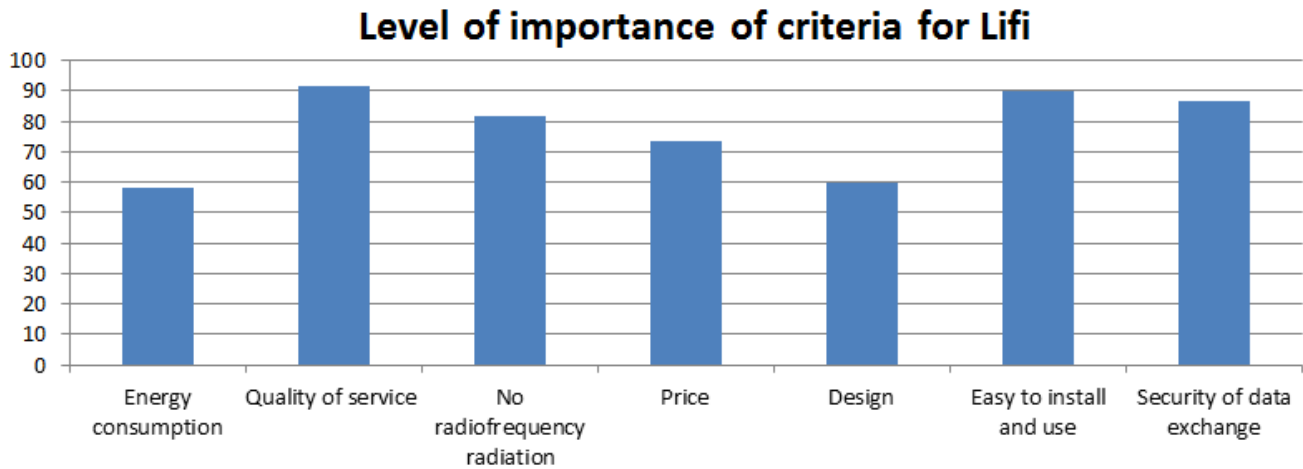


Figure 35: level of importance of several criteria evaluated by the Turkish participants regarding Lifi

As shown in the figure above, the level of importance of all the selected criteria is quite high with two main categories:

- A level of importance estimated higher than 70% for the following criteria: quality of service, no radiofrequency radiation, price, easy to install and use, security of data exchange
- A level of importance a little less high, around 60%) for two criteria: energy consumption and design

For the replacement of Wifi at home⁵,
95% of Turkish participants say to be willing to pay
an average invoice of 75 € with the following distribution (20 participants):

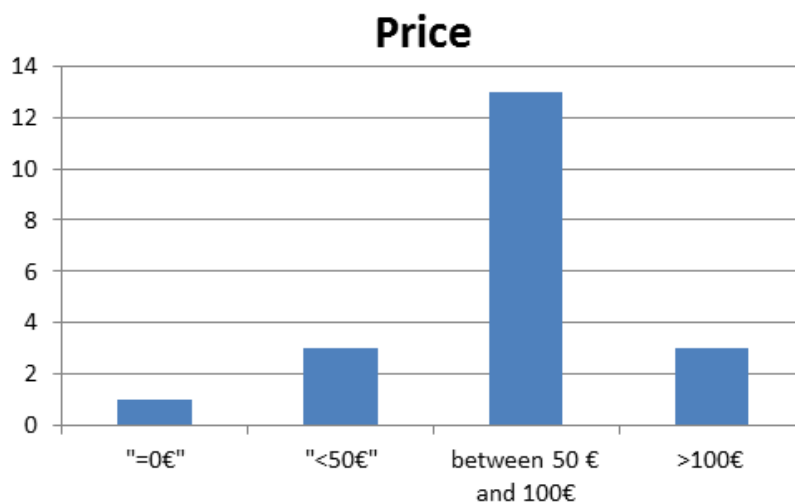


Figure 36: Evaluation of the price maximum that Turkish people would be willing to pay for the replacement of Wifi at home

⁵ The price of a Wifi extender (about 80€ in France) was given to the German participants for their information.

3.3 Comparison between countries

3.3.1 Comparison service by service

3.3.1.1 Lifestyle





	France	Germany	Turkey
Part of the participants willing to pay	96 %	100%	90%
Estimated price in average	21 €/month	18€/month	38€/month
The most representative logo			  Same level of appreciation with 29%

Table 1: Comparison between France, Germany and Turkey regarding the lifestyle service

3.3.1.2 Health






	France	Germany	Turkey
Part of the participants willing to pay	32 %	50%	55%
Estimated price in average	6.50 €/month	4.70€/month	15.60€/month
The most representative logo	 <p>Appreciated (33.2%) for a service dedicated to health aspects</p>  <p>Almost equally appreciated (32.4%) – Considered less restrictive in terms of scope</p>		  <p>Almost the same level of appreciation with respectively 32% and 31%</p>

Table 2: Comparison between France, Germany and Turkey regarding the health service

3.3.1.3 Smart energy





	France	Germany	Turkey
Part of the participants willing to pay	84%	80%	60%
Estimated price in average	3.19 €/month	4.60€/month	11.80€/month
The most representative logo			  Almost the same level of appreciation with respectively 30% and 29%

Table 3: Comparison between France, Germany and Turkey regarding the smart energy service

3.3.1.4 Wifi versus Lifi

	France	Germany	Turkey
Wifi strengths	ubiquity, convenience, mobility, installation	Ubiquity, compatibility, cost	ubiquity, convenience, compatibility, mobility
Wifi weaknesses	radiofrequency radiation, security, speed	radiofrequency radiation, range, reliability	radiofrequency radiation, range
Expectations regarding Lifi	<ul style="list-style-type: none"> Retrieve the same level of quality of service as with wifi Remedy to the weakness of wifi: security of data exchange and radiofrequency radiation 	<ul style="list-style-type: none"> Level of importance of all the selected criteria evaluated between 60% and 70% by the German participants (consumption, QoS, radiofrequency, price, easy to install and use, security) Only the criteria "design" is a little bit below the whole 	<ul style="list-style-type: none"> Level of importance higher than 70% for the following criteria: quality of service, no radiofrequency radiation, price, easy to install and use, security of data exchange
Part of the participants willing to pay	100%	60%	95%
Accepted average price by users for the replacement of Wifi at home	79 €	75€	75€

Table 4: Comparison between France, Germany and Turkey regarding Wifi versus Lifi

3.3.2 Strong convergence in terms of expectations

As described in the previous pages (particularly in § 3.4.1.3) and confirmed in the following figure, people expect several things when they think about their “home in the future”: they are looking for a smart home, which conciliates ergonomics (“user friendly”) and high tech (multimedia).

The strong analogy of the results between the countries (see the figure below please) confirms a general European trend.

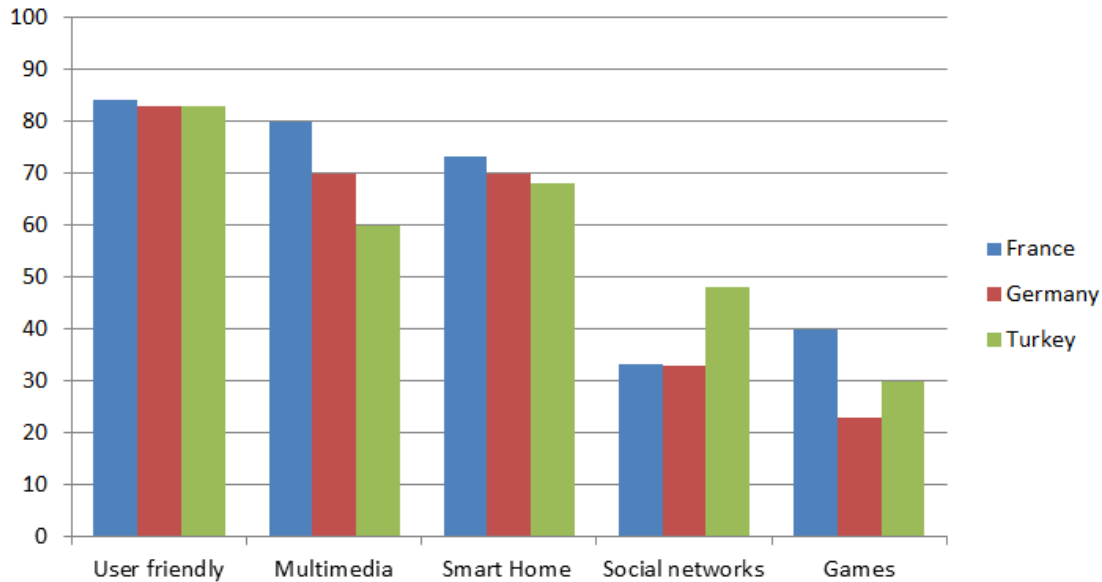


Figure 37: Level of importance (in %) attributed by all the participants regarding their expectations in terms of services

At the end of each interview, the participants to users' interviews had to give some key words to shortly sum up their expectations regarding “the home in the future”. All these key words confirm this strong convergence in terms of expectations between countries as shown below ⁶:

	France	Germany	Turkey
Lifestyle / House management	Remotely Save time and convenience As if I was at home facilitate everyday tasks	remote control from everywhere media distribution cabled connection for everything (sauna management, etc)	Remote control Interaction remote access
Wellness	Be sure that my house is a safe and secure place More leisure, pleasure and emotions a house which cares of me (health, danger, intrusion),	Security use of robots within my household comfortable living in a smart and intelligent home gain of comfort and control	Security, Safe Monitoring Feedbacks Health Comfort
Sustainability	Green Ecological no radiofrequency radiation both convenient for me and compatible with sustainability	energy efficiency	« Ecoist » (cares about environment) low cost energy saving energy efficient
Ergonomics	A intuitive smart home, Less constraints, more comfort Usefulness without gadget Convenient, Helpful, easiness A simply and simplified life A house which is personalized according to my needs	Flexible Easy smart/user-friendly home user-friendly, understated	easy to use, wieldy easy access answer to my request efficient accessible customizable
High-tech	High tech smart home, Technology, Automated	combine all technologies together, remote control, saving money with	Multimedia smart home

⁶ The complete table is available in the annex of the document

	the technology serves me Technology is totally in my service big screens, audio and video high definition	this new systems automation intelligent home	auto control Connected Smart
Others	Integrated system > Thanks to a single integrated system, be able to monitor (remotely or not) my house, A smart home, with a single service in order to manage it Car > Take into account the car, which is more or less a part of the home	cost efficient, saving money reliable integration of E-Cars into the smart home system	privacy confidential personal compatibility low cost, profitable single device

Table 5: Users' expectations regarding "the home in the future" summed up thanks to key words (extract)

3.4 European conclusions

This paragraph aims at drawing up all the fundamental users' expectations on a "European" scale⁷. Beyond the questionnaire used during the interviews, this paragraph takes distance in order to sum up these expectations. This paragraph is divided into two parts:

- The first one gives the general European users' expectations, addressing the prerequisites, the expectations themselves and the brakes regarding Acemind scope
- The second paragraph deals with the impacts on ACEMIND project, that is to say what follows from this step of interviews on the initial functional vision of Acemind project.

3.4.1.1 General expectations

3.4.1.2 Users' prerequisites

For all the participating countries, the interviews emphasized not only the users' expectations, but also some characteristics, considered as elementary prerequisites by the participants. Without these prerequisites, even if the Acemind concepts seem interesting to people, the interest and the attractiveness will be totally decreased.

As far as these prerequisites are concerned, participants expect:

- **Quality of service:** this point gathers network performance and availability of the services. When a service propose to monitor and manage a house, people require a service that runs, in which they can be confident and with a very high level of quality of service
- Likewise, another elementary prerequisite is the **network security**, against hacking for instance. Be able remotely to open doors, to check the electrical consumption or to monitor the appliances can become a disaster if there is a possibility of hacking
- Lastly, the data **confidentiality and the respect of the privacy are** also unavoidable elements: no commercial or marketing action led by the service provider will be appreciated by people. For instance, even if this service provider owns a lot of data about a family, its habits, its devices, people consider that they have to remain confidential: they don't have to be used to propose new offers or new equipment for instance.

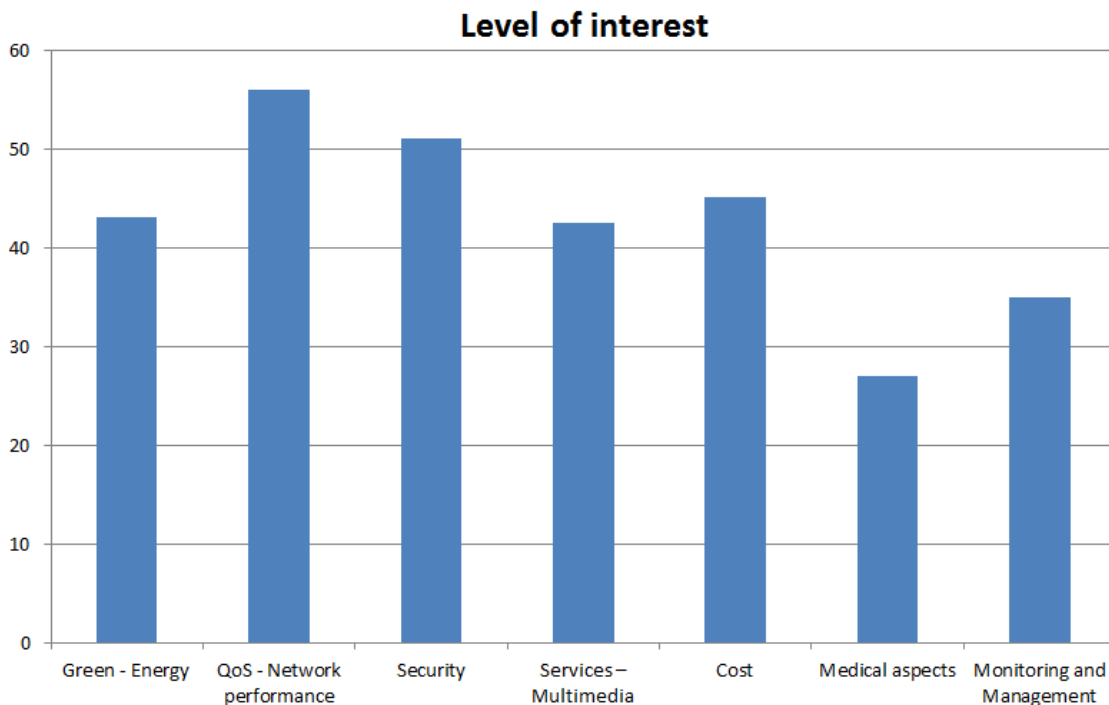


Figure 38: Level of interest (in %) attributed by all the participants (French, German, Turkish) to the main topics dealt with the Acemind project

⁷ "European scale" means that this paragraph draws up the general synthesis of the different countries having achieved some users' interviews

3.4.1.3 Expectations

Regarding the users' expectations related to the Acemind concept, the interviews enable to emphasize five main priorities identified by people:

1. Lifestyle / House management

This part includes all what people would wish in terms of everyday life related to organization and management of their home. In particular, the interviews emphasize the fact that people would like to remotely manage their house in order to:

- Monitor all the logistical aspects of the house (lights, curtains, heating, etc.)
- Program and monitor their electrical appliances (washing machine, etc.)
- Manage their numerical contents (video, music, etc.) and access to them. The aggregation and the location of the storage of the contents are recurrently seen as an issue

More globally, people would like to manage their entire domestic environment as if they were at home. Some people even think to include the car in this vision.

Lifestyle services are mainly based on a communication from the user to the home (to give order, to manage, etc.)

2. Wellness

People are looking for welfare and safety in a house which “looks after” them (danger, intrusion, health), sending them information or alerts if needed. On the contrary to lifestyles services, wellness services are mainly based on a “communication” from the home to the user (to give information, to alert, etc.):

- **Detection of danger or breakdowns** (frost, smoke, etc.): people would like to minimize the risks of dangers at home (Some functionalities reach a level of interest around or higher than 90% for the participants). People consider that more and more accidents are linked with domestic environment hence the fact that people would like to have a global system that can detect all potential source of dangers and alerts. This point includes the detection of electricity breakdowns, smoke, etc.
- **Intrusion**: the risk of intrusion and robbery are not zero. Even if people relativize this risk, they remain conscious of its eventuality (They mainly think about it when they are on holidays, absent during a long period, etc.). To minimize this risk, several alternatives are mentioned by people: for instance, they would like to be alerted in case of intrusion, or monitor their house with webcam or simulate their presence when they are out of their house (turn on/off the lights randomly, etc.)
- **Reassurance**: For a large part of the participants, they often consider that they lack time. They do a lot of repetitive tasks every day without fully paying attention to them: this is the case for closing the doors of the house, for example. Likewise, if children come back home before their parents, their parents often say to be interested to know when they are at home. For all these aspects, people would like to have the possibility to check the current status of what concerns them (or worries them)
- **Pleasure**: in their “home of the future”, the participants also add a dimension of more pleasure and emotions. According to them, new technologies are able to increase the feeling of more comfort and fun at home thanks to new functionalities and devices (For instance, to choose the ambiance in terms of lights and music, to feel more emotions thanks to 3D and bigger screens, etc.). Even if the interviewed people converge to say that this point is an “extra”, it is part of the definition of their “home of the future
- **“Health”**: lastly, for a part of the participants (niche market), some people expect a service against health problems and which will be able to alert if they have a problem.

The main target of this “wellness expectation” is to reassure people so that they feel confident in the status of their house. They wish a service that notifies them if something abnormal is happening at home.

3. Sustainability

The Acemind concepts aim at anticipating what could be the home in the future, with a projection in the medium term (about 5 years). Among all the main themes mentioned by the participants, one is dedicated to the sustainability and “green” aspects motivated by savings, environmental and health issues:

- **Optimization:** The participants mentioned their interest regarding the energy consumption of their house, how to monitor it, survey it and decrease it
- **No pollution:** as far as environmental issues are concerned, people are conscious of the current energetic wasting (for instance, they mention solutions for heating like energy self-sufficient house, green home). They are in favour of this cause even if they feel relatively powerless to remedy it.
- **No radiofrequency radiation:** the participants would like ideally technologies which guarantee the absence of impacts on the human being's health. They are inclined to discover new technology (likelifi) but remain doubtful regarding the level of satisfaction and the absence of impacts on health of these other new technologies.

4. Ergonomics

The users' interviews also brought out some generic expectations regarding ergonomics:

- **Utility:** people expect a service that answers to their needs, facilitating their everyday lives and saving them time (housework, redundant tasks, logistical constraints in a house)
- **Convenience**
 - **Unified application** (all integrated): People would like to monitor all the aspects related to their home thanks to a single tool. According to the participants, this “all in one” application represents a differentiating element in terms of simplicity in comparison with existing home automation services
 - **Easy-to-use** service: people are looking for simplicity and functional services, easy to understand and install, adapted both for technophile and non-technophile people. More widely, the requirements in terms of “accessibility” (in the broad sense) directly depend on the users' profile (for instance, young or old people, with or without handicap).

5. High tech

Lastly, the interviews put the emphasis on the high-tech dimension regarding the users' expectations. However, this expectation is not a need for itself: people mentioned high-tech functionalities and services in order to answer to a true need which is closely related to the previous expectations mentioned just above. Actually, this high tech dimension is in the service to the other expectations: it is omnipresent and often underlying but has to remain **transparent** from a user's point of view: a service with a high level of technology has to remain as **easy-to-use** as a basic system. These are some verbatim extracted from the interviews, illustrating this dimension:

- **Remote management and monitoring** of the home: “Thanks to my smartphone, I could open/close the shutters , I could turn on/off the lights, etc.,”
- A house **full connected**: “I can check all the status of my house”, “according to me, home automation has to enable that my entire house is connected and remotely manageable”. Even the car is sometimes considered as a part of this full connected domestic environment (Examples of applications: load level for an electrical car, robbery, etc.)
- A **real time** service: “I would like to have all in real time”
- **Performance**: “big screens, audio and video high definition, communication ways more innovative (holography, "telepresence")”
- **Smart**: “I want a really smart system. System decides what it must do”, “I imagine a system which is smarter. I must not deal with all of these kinds of adjustments.”

To summarize, the users' expectations regarding the Acemind concept are the following:

A service that enable people to have a bi-directional communication with their house:

- People towards home, to remotely manage their house (which mainly refers to what is called "house management services")
- Home towards people, to receive information or alerts from their house (which mainly refers to what is called "wellness services")

...All these communications being integrated in an ecological environment, in which ergonomics and high-technology are in the service to human beings.

Here are some verbatim particularly well illustrating these users' expectations:

"Wherever I am, I would like manage my house as if I were at home"
(Directly referring to house management aspects)

"What is important is to save time, or money, or comfort"
(Referring respectively to house management, sustainability and wellness aspects mentioned above)

"Without seeing it, the technology would have to help people in the everyday life"
(Referring to a need of transparency of the technology and a need of simplicity)

3.4.1.4 Brakes

During the users' interviews, some brakes were identified by people:

- Globally, the perimeter of the ACEMIND project offers **nothing new**: “I have already seen this kind of videos”, “it is good but without any surprise”, “this is the basis of the home automation”. People particularly insisted that it is the integrated dimension of the entire concept which represents the added-value.
- Then, the participants consider that such a service could be convenient for them, but above all, it also remains **not indispensable**. Moreover, according to people, some functionalities are considered gadget and “too much”. As mentioned by people “Be careful to big brothers and gadgets services”. “I don't want to become paranoiac”
- Lastly, some criteria determine the users' point of view on the ACEMIND concept and remain essential for them. The most frequently criteria mentioned by people are **installation, configuration and price** (verbatim: “I could be interested but it depends on the installation aspects and the price”, “The installation and the configuration of all this system is huge”. “I am doubtful: is it easy to install such a system in an existing house?”)

3.4.1.5 Impacts on ACEMIND project

This paragraph deals with the impacts on ACEMIND project, that is to say what follows from this step of interviews on the initial functional vision of Acemind.

3.4.1.6 Adjustment of the scope of services

At the beginning of the Acemind project, three main services have been defined (lifestyle, health and smart energy) and were thorough during the interviews. These three services were a basis in order to have inputs for the participants so that they can comment and enrich them.

Comparing these initial services with the results detailed just before (§3.4.1.1-**Table 5: Users' expectations regarding “the home in the future” summed up thanks to key words (extract)**)

3.5 European conclusions

This paragraph aims at drawing up all the fundamental users' expectations on a "European" scale. Beyond the questionnaire used during the interviews, this paragraph takes distance in order to sum up these expectations. This paragraph is divided into two parts:

- The first one gives the general European users' expectations, addressing the prerequisites, the expectations themselves and the brakes regarding Acemind scope
- The second paragraph deals with the impacts on ACEMIND project, that is to say what follows from this step of interviews on the initial functional vision of Acemind project.

General expectations), the functional perimeter of Acemind project is consolidated by the users' feedback since all the scope defined initially appears in the general expectations. In particular, we can see the following analogies between the main topics:

- Lifestyle services are reminiscent of the lifestyle / house management topic,
- Health services are reminiscent of the wellness topic
- Energy saving service are reminiscent of the sustainability topic

However, a few gaps of distribution appear (i.e. an item is classified in another topic) between these both categorizations. To sum up these gaps, the following table draws up the comparison.

In that table:

- **The similarities are written in green:** an item was part of the initial service and it is also classified in the same category by users
- **The gaps of distribution are written in red:** an item was part of the initial service and it is classified in another category by users
- **The new topics are written in black:** an item was not define in the initial services and users have included this element during the interviews

Initial service		...is reminiscent of users' expectations		Gap of distribution
Name	Definition	Name	Definition	
Lifestyle	<ul style="list-style-type: none"> Management: allowing to control (remotely or not) home's equipment (lights, doors, etc.) and electrical appliances (white and brown products) Monitoring: allowing to monitor home security, such as intrusion detection, water flood or fire and get notification 	Lifestyle / House management	<ul style="list-style-type: none"> Organization and remote management of home Monitor all the logistical aspects of the house (lights, curtains, heating, etc.) Program and monitor their electrical appliances (white and brown products) Manage their numerical contents (video, music, etc.) and access to them. The aggregation and the location of the storage of the contents are recurrently seen as an issue 	<ul style="list-style-type: none"> Initially home security was part of the lifestyle services. Users integrate this aspect into Wellness (see below please) The management of users' numerical contents was mentioned anywhere in the initial services
Health	<ul style="list-style-type: none"> Allowing to monitor if everything is fine with your elder or disabled relatives, at your or their own home, when you're away 	Wellness	<ul style="list-style-type: none"> Globally deals with the feeling of welfare at home. It includes two different dimensions: <ul style="list-style-type: none"> Minimizing fears and dangers: concerns all the aspects regarding the detection of dangers (water flood, fire, etc.), intrusion and other unexpected events happening at home (like electricity breakdowns, discomforts of a relative for instance). In their "home of the future", the participants also add a dimension of more pleasure than currently. People expect more comfort, leisure and emotions thanks to new functionalities (to choose the ambiance in terms of lights, music; etc., to feel more emotions thanks to 3D, bigger screens, etc.) 	<ul style="list-style-type: none"> In addition to health aspects, wellness integrates all the aspects of detection of dangers and alerts (initially in lifestyle services) The notion of the increase of comfort and pleasure were mentioned anywhere in the initial services
Smart energy	<ul style="list-style-type: none"> Allowing to follow and control (remotely or not) your energy consumption, optimal management of energy renewal and energy consumption, flatten the home peak consumption, alert in case of electricity breakdown 	Sustainability	<ul style="list-style-type: none"> Topic dedicated to the sustainability and "green" aspects motivated by savings, environmental and health issues: <ul style="list-style-type: none"> Optimization: how to monitor energy consumption, survey and decrease it at home No pollution: how to limit wasting No radiofrequency radiation: limit impacts on the human being's health 	<ul style="list-style-type: none"> Initially, the alerts in case of electricity breakdowns were part of the smart energy services. Users integrate this aspect into Wellness (see above please) in order to group all the aspects of detection of danger and alerts.

Table 6: Adjustments of the initial definition of the services

3.5.1.1 Positioning of the ACEMIND demonstrators

At the end of the Acemind project, five demonstrators are planned:

- UNIC (Unified Network Interface and Customized): An ACEMIND dashboard for monitoring and management of the hybrid network (could also be proposed on each language, i.e. English, French, German, Turkish, Czech, etc.).
- WoP - Wall of Presence
- HOPE (HOMe Power Efficiency): The demonstrator will present a home solution to flatter the consumption peak.
- SoL (Sign of Life): This demonstrator consists on survey the quality of personal healthcare in home environment.
- LiFi Extender: Propose an alternative wireless communication solution by using optical waves.

The following picture illustrates the 3 services emphasized and consolidated thank to the users' interviews. On this picture, each demonstrator is positioned in order to make the connection:

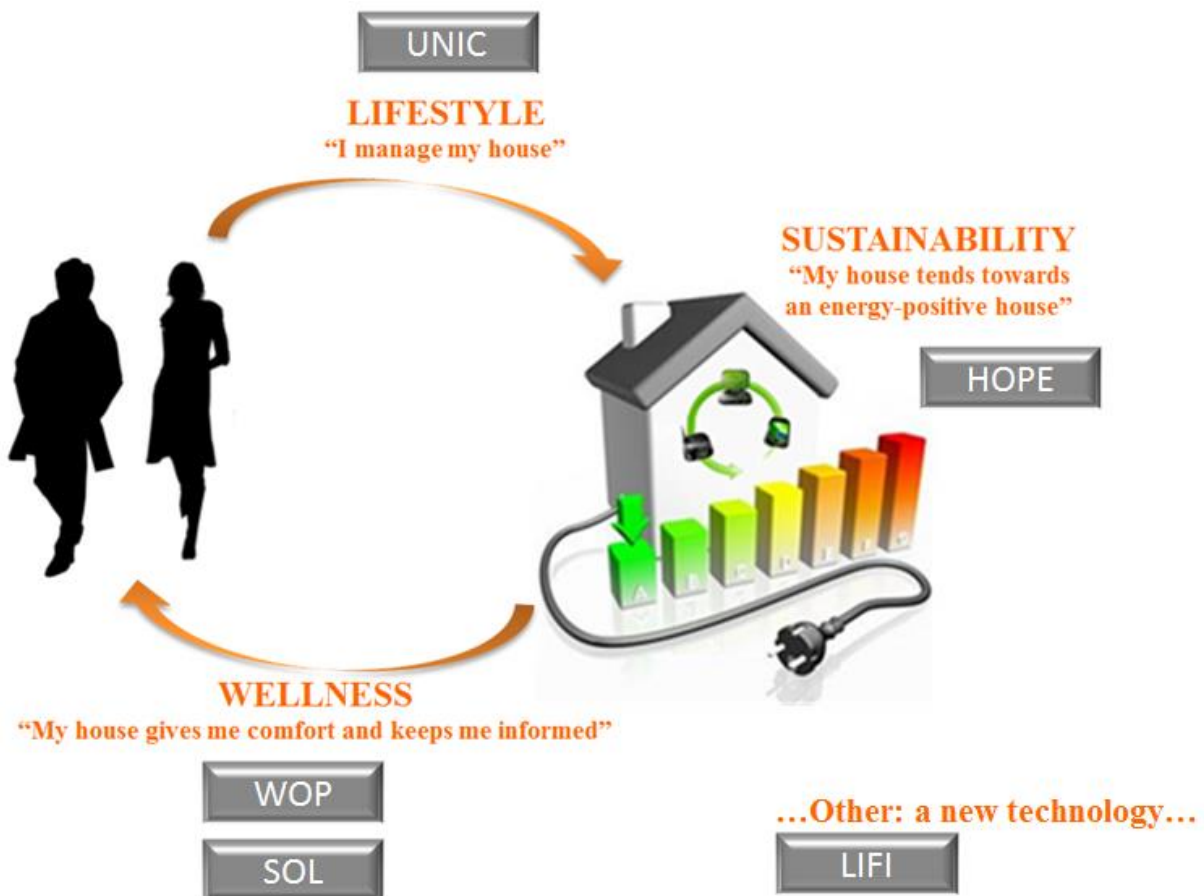


Figure 39: Connection between the 3 services “lifestyle”, “wellness” and “sustainability” and the 5 demonstrators defined in the Acemind project

As far as the demonstrator WOP is concerned, from a user point of view, this demonstrator is rather attached to the wellness service, since this wall of presence will bring pleasure thanks to its high tech capabilities. On a technical point of view, this demonstrator can also be connected with the lifestyle topic (since this topic deals with the device management issues)

Regarding “Lifi”, the demonstrator is a case apart from the other demonstrators. Indeed, it is included in Acemind project as a new wireless technology alternative to radio (WiFi). It is not part of the home automation services strictly speaking.

...

4 Operator expectations

4.1 Meet quality of experience customer expectations

4.1.1 Quality of service and quality of experience

Most of the requirements of the operator regarding the Quality of Service (QoS) concern the classification of services to manage potential congestion in the home gateways and home network infrastructure devices (HNIDs). As stated in [2] the HGI QoS approach is class-based i.e. a service signature identifies a class and all members of that class share the same queue. The alternative would have been to have a queue per service instance, but this has several drawbacks, Firstly the number of queues is unbounded and could be large, and in the case of round robin queues, there would be many more weightings to configure. Secondly, identifying service instances is more difficult than classes, and cannot be done in advance.

In the upstream direction, the main requirement is to avoid excessive delay for voice, provide sufficient bandwidth for voice and video, and to prevent best-efforts traffic being completely starved by higher priority queues. There are three fundamentally different types of traffic with regard to QoS: voice, video and data. This would require three queues. However there is a need to further distinguish between at least 2 different types of data (e.g. for higher priority control data or to support a premium data service). Further, the overload protection mechanism mentioned above requires an additional queue; making **the total number of upstream queues required at least five**.

In the downstream direction there are two concerns, ensuring that WAN traffic is not blocked by transit traffic, and if there is downstream congestion due to a rate mismatch caused by a slow HN technology, that the managed traffic gets priority. There may be two different types of transit traffic, simple data and streaming e.g. from a media player. **The downstream needs a somewhat simpler queue structure, with four queues**.

Additionally, on both downstream and upstream directions, as most of home network connectivities are likely subject to congestions due to varying total bandwidth (Wi-Fi, PLC), an appropriate mapping is necessary between the DSCP QoS marking performed at layer 3 and the underlying layer 2 QoS marking. Note that in the downstream, DSCP marking is already performed in the access link but remarking is performed in the Home Gateway for the LAN segment. Regarding layer 2 marking, IEEE 802.11e standard specifies 4 classes for the Wi-Fi connectivity, HomePlug AV specifies as well 4 classes for powerline communications (with a possible extension to 8 classes) Additional requirements about the QoS monitoring and control are defined as well at the HGI in [1]:

- The home gateway shall be able to check the list of the QoS classes and the mapping between these classes and the queues.
- Regarding the queues, it shall be possible to measure its main characteristics (average and max queue length, # of dropped packets, throughput ...)

To ensure satisfactory Quality of Experience (QoE), home network performance monitoring is key. In fact, different standardization bodies address performance measurement. For example, BBF TR-143 provides an active monitoring test suite which can be leveraged by Network Service Providers to monitor and/or diagnose their broadband network. It allows computing parameters such as: one way delay variation, round trip delay, one way loss ratio and HTTP/FTP throughput. Furthermore, IEEE 1905.1 defines a set of home network local metrics which are agnostic to the underlying connectivity technology and a way to retrieve them. Such metrics include: packets losses, physical rate, link availability, MAC throughput capacity, etc.

Moreover, it is important for an operator to remotely manage the home network. In particular, Home gateway management can be performed using BBF TR-069; among other functions, it allows to upgrade the firmware of the device.”

4.1.2 Ease of installation and use

As for end users, simple installation and use of the home networks by its clients is a key factor of economic success. This applies both to the HNIDs infrastructure (Extenders) and the operator boxes (Home Gateway, SetTopBox) and the deployment of services on top of this network. Regarding the HNIDs, plug and play solutions are a key requirement for the operators to save OPEX in the aftersales support (hotlines), which may cost up to some tens of euros a year per customer.

In addition, the design of non-intrusive, educative, and user friendly dashboard to monitor the status of the services and the network, and manage them, is the second pillar for the operators to let users troubleshoot themselves their home networks.

4.1.3 User assistance and troubleshooting

The main expectations of major European operators regarding user assistance and troubleshooting are contained in the following document: Home Gateway and Home Network Diagnostics Module Requirements, updated in April 2013 [1]

These requirements concern both the network functionalities and the hardware/software capabilities and status of the devices of the home network. From a high level point of view, the network oriented requirements consist into:

- Getting a view (graphical interface) of the presence of all connected devices to the home network is mandatory. Recommended functions are historisation via a log of changes or additional information about the devices (eg. OS...)
- A determination of the links connecting the devices in the home network (eg. to the Home Gateway) is also important. This may be done either passively or via active probing. Type of connectivity and information about PHY rate in the LAN is recommended
- The home gateway shall be able to test the IP reachability of all connected devices via a Ping test, the home gateway shall also be able to maintain a table of local IP addresses of the home network and end devices.

The overall diagnosis architecture proposed by the HGI is depicted in the Figure below

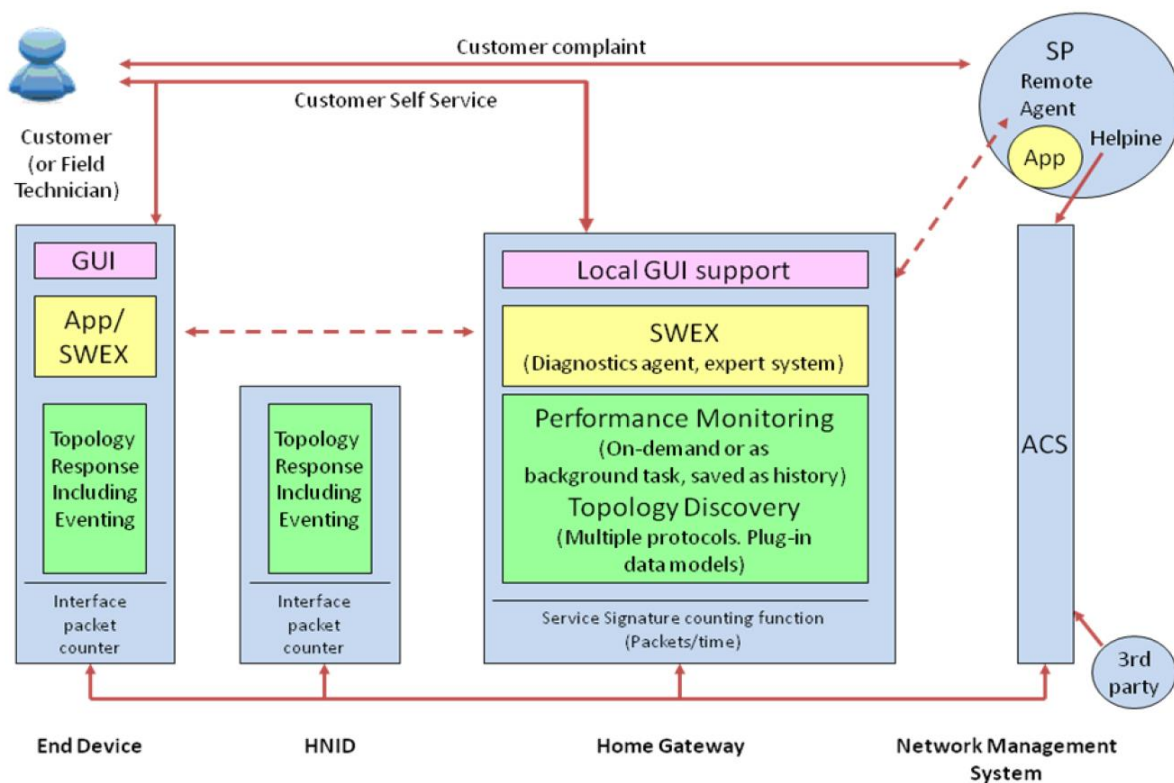


Figure 40: overall diagnosis architecture proposed by the HGI

4.2 Improvement of existing services and deployment of new services

4.2.1 Existing services

Triple / Quadruple play are the services provided today by most European Internet Service Providers (ISP). The Quality of Service requirements listed above often constraint operators to recommend direct Ethernet connections or simple network configuration for QoS demanding services such as IP TV.

Regarding the service themselves the trends for their improvement lie in the increase of the capacity required.

- For the internet access the capacity already jumps today from tens of Mbps with ADSL/ADSL2+ to hundreds of Mbps with fibre access with first launches of Gbps offers, waiting for multi-Gbps access before 2020.
- For the IP TV services, HD TV services demand today 5-8 Mbps and future 4K possibly combined with 3D will demand 10 to 20 Mbps. The improvement of the video compression efficiency will likely limit the increase of the video throughput demand. Nevertheless, the multiplication of simultaneous TV flows in the home is the main factor of throughput demand for video (watch and record, multiple TV sets ...)

4.2.2 New services

Most of new services for the home networks concern smart applications and devices. Smart Home is often considered as a fifth play for the ISP service bundles.

These services often do not require large bandwidth but are very sensitive to disconnection such as security oriented services part of the wellness service type identified in section 2.4.1.1.2, i.e. they require a 100 % availability of the end to end link from the service platform (server) in the cloud up to the sensor/actuator in the home. This may go through the need of multiple links in parallel both in the access and the LAN (home) segments of the network.

4.3 Profitability

4.3.1 Investment costs (CAPEX)

4.3.1.1 Initial Deployment

Most of the initial costs are usually supported by the internet service provider and lies into 2 main parts

Access segment

This cost is for the deployment of copper cable and or fibre infrastructure to connect the home. This cost represents the main CAPEX for the internet service provider and has to be made prior to customer subscriptions.

As an example Orange announced in 2010 an investment of 2 billion euro over 5 years to deploy fibre at the access in France. [3]

It can be noted that this cost is often shared with public authorities.

Home segment

Home Network Equipment package usually comprises:

- Home Gateway
- Set Top Box(es)

And may also comprise:

- Network extenders (HNIDs)
- Some end devices (smart home devices, ...)

Costs of such packages may vary from dozens euro to several hundred of euro depending on the quality and the composition of the package. Customers may share the cost of this initial equipment (eg. network extenders are typically at the charge of the end customer whereas gateways may be lent, rent, or sold by the ISP).

4.3.1.2 Material renewal

Depending on the equipment quality and the operator, 5 to 15% of home gateways are refurbished every year. For a typical European operator with 10M customers this may represent several million (5 – 20 millions) euros each year. The reduction of this cost goes essentially through new design of home gateways with the consideration of the refurbish from the initial design phase.

4.3.2 Operational costs (OPEX)

4.3.2.1 Customer assistance

A large part of the operational costs for the operators lies in the customer assistance. Hotlines cost for typical European operators (5-20 million customers) represents year several hundreds of millions of euros. This large total makes even more attractive the development of self-care solutions as ACEMIND will provide with the development of smart monitoring and management dashboards.

4.3.2.2 Maintenance

A part of their global networks, the access segment represents operational costs for any internet service provider. This could be a renting cost of a maintenance cost depending on the case where the operator owns or not its access network.

4.3.3 Expected profitability

Due to the large investment necessary for the deployment of ultra-high rate and reliable access networks (eg. fibre) the profitability and the return on investment have to be considered over large periods such 10 years or more.

When considering the home network segment only, as the investment is much lower for the operator (provision of a bundle of devices), profitability should be measured over shorter period, maximum 3 years.

5 Conclusion

The deliverable D2.1 “User and operator requirements” is divided into two parts.

Regarding the first part, focused on the users’ requirements, a user centric approach has been used, implying users from different countries (France, Germany and Turkey) in order to enrich the results. This approach enables to:

- Validate the interest that users’ show regarding the functional scope of Acemind
- Refine the functional definition of the services constituting the subject
- Identify the key points of the users’ expectations and brakes
- Establish a first level of appreciation between LiFi and Wi-Fi

The following illustration presents the synthesized results of this study:

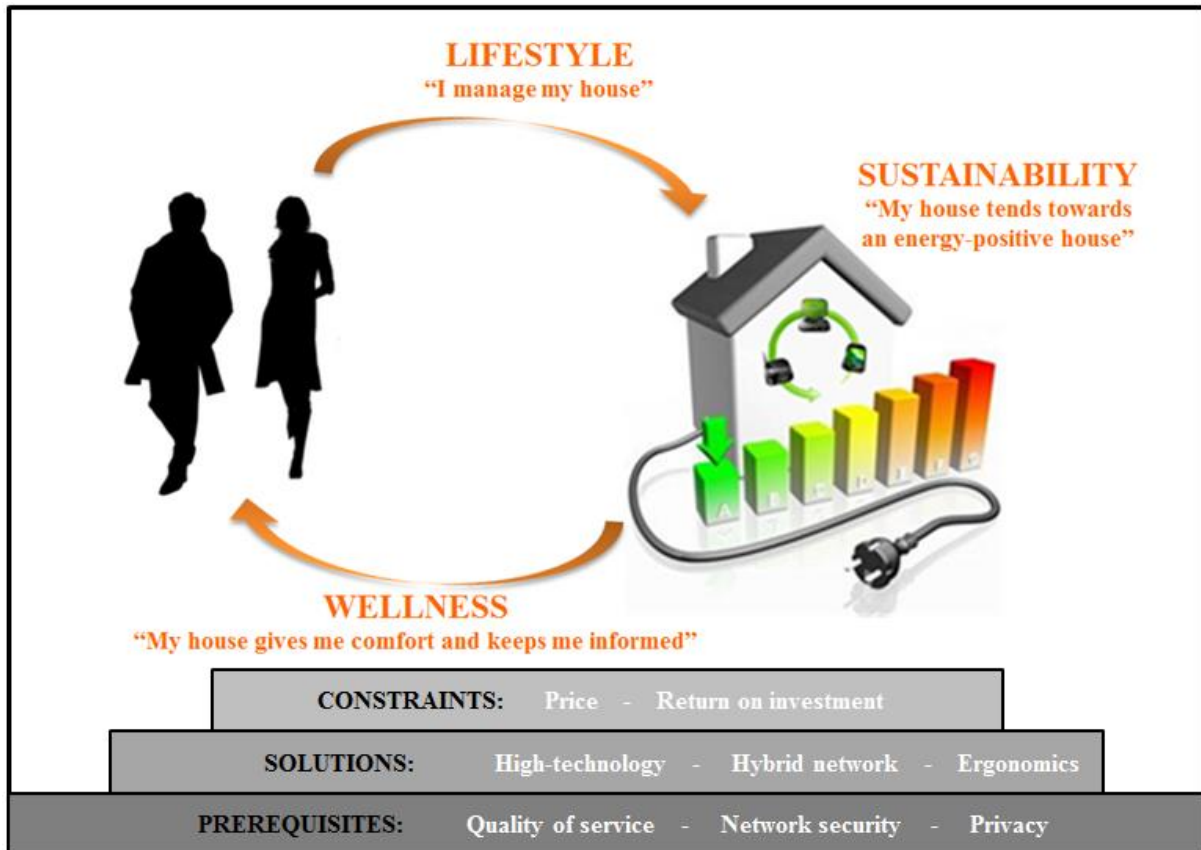


Figure 41: European users’ expectations regarding ACEMIND scope

Source of some illustrations: <http://www.freelogovectors.net/business-people-silhouettes/>

Regarding the second part, focused on the operator requirements, the operators’ expectations regarding the ease of installation (plug and play) and use of the home networks (self-troubleshooting) have been presented. Simpler networks would help decreasing hotlines costs for operators. As for end customers, operators have strong expectations on service QoS, as well as supplementary expectations on network and services QoS monitoring. This is the basis for accurate diagnosis of the network issues encountered by its customers.

6 Annexes

6.1 Toolkit

In order to have a homogeneous methodology and comparable results, a complete toolkit was delivered to each country organizing users' interviews. This toolkit was constituted by three documents: a methodological guide (User Interview Guide.doc), the questionnaire (User Interview Questionnaire.doc) and a template for the synthesis (User Interview Synthesis.xlsx)

6.1.1 User Interview Guide

The User Interview Guide aims at giving all requirements and prerequisites to put in place the user face-to-face interviews so that they have all a homogeneous process and comparable results wherever they take place.

Link: <..\PARTENAIRES\Acemind - WP2 - User Interview Guide V1.1.doc>

6.1.2 User Interview Questionnaire

The User Interview Questionnaire contains all the questions asked during the interview. This questionnaire deals with the connected home of tomorrow, the home automation services and the LiFi (Light Fidelity) technology versus the Wifi

Link: <..\PARTENAIRES\Acemind - WP2 - User Interview Questionnaire V1.1.doc>

6.1.3 User Interview Synthesis

The User Interview Synthesis is a template for the synthesis of the interviews enabling to reconstitute and summarize the analysis of all the passed interviews in a country

Link: <..\PARTENAIRES\Acemind - WP2 - User Interview Synthesis V1.0.xlsx>

6.2 Profiles of participants to the interviews

6.2.1 France

	Gender (M: Man - W: Woman)	Age	Marital status (S: single - C: couple)	Number of children	Age of children	Number of children living at home	Job	Dwelling type (H: House - F: Flat)	Size of dwelling town A: <10000 B: between 10000 and 50000 C: >50000	Comments
participant 1	M	38	C	1	2	1	Accountant	H	A	
participant 2	M	35	C	2	6; 11	2	Project Manager	H	C	
participant 3	W	55	C	2	24; 27	0	Marketing	F	C	> She is widow > She has a second home
participant 4	W	63	C	3	25; 27; 31	0	Managemen t Assistant	H	C	> She has a second home
participant 5	M	47	C	4	7; 13; 20; 23	1	Sales Executive	H	B	
participant 6	M	41	S	0	0	0	Computer programmer	F	C	> He often travels for
participant 7	M	22	S	0	0	0	Student	F	C	
participant 8	M	24	C	0	0	0	Student	F	C	
participant 9	W	25	C	0	0	0	Home help	F	B	> Her father is seriously ill
participant 10	M	23	C	0	0	0	Student	F	B	
participant 11	M	39	C	2	2; 6	2	Headmaster	H	B	
participant 12	W	37	C	1	2	1	Engineer	H	A	
participant 13	M	42	C	2	4; 7	2	Project Manager	H	C	
participant 14	M	60	C	2	30; 33	0	Technician (Retired)	H	A	
participant 15	W	62	C	2	30; 33	0	Secretary (Retired)	H	A	
participant 16	M	34	S	0	0	0	Engineer	F	C	
participant 17	W	60	C	3	32; 35; 37	0	Teacher (Retired)	H	A	Several rented flats and a second home
participant 18	W	44	C	3	7; 10; 12	3	Teacher	H	B	
participant 19	M	59	C	2	30; 36	0	Computer scientist (retired)	H	B	
participant 20	W	39	C	2	15; 12	2	Accountant	H	A	
participant 21	M	35	S	0	0	0	Computer scientist	F	C	> He often travels for
participant 22	W	44	C	2	10;13	2	Engineer	F	B	
participant 23	M	65	C	2	38; 41	0	Trader (retired / hemiplegic)	F	B	
participant 24	M	42	C	3	3; 10; 14	3	Electrician	H	A	
participant 25	W	58	C	2	34; 38	0	liberal nurse	H	B	

Table 7: Profiles of the French participants

6.2.2 Germany

	Gender (M: Man - W: Woman)	Age	Marital status (S: single - C: couple)	Number of children	Age of children (1st age; 2nd age; etc)	Number of children living at home	Job (Profession al activity)	Dwelling type (H: House - F: Flat)	Size of dwelling town A: <10000 inhabitants B: between 10000 and 50000 inhabitants C: >50000 inhabitants
participant 1	W	25	S	0	0	0	student medical science	H	A
participant 2	M	46	C	2	8, 3	2	electrician	H	B
participant 3	W	34	C	3	5,3,1	3	commercial clerk	H	C
participant 4	M	37	C	2	4,2	2	IT Systems Administrator	H	C
participant 5	M	25	S	0	0	0	Sales manager	H	C
participant 6	M	42	C	2	5,2	2	Clerk in procurement	H	A
participant 7	M	44	C	2	5,7	2	Product manager	F	C
participant 8	M	35	C	0	0	0	Director Strategic Positioning	H	A
participant 9	W	35	C	0	0	0	Marketing Manager	H	C
participant 10	M	32	C	0	0	0	Buyer	H	A

Table 8: Profiles of the German participants

6.2.3 Turkey

	Gender (M: Man - W: Woman)	Age	Marital status (S: single - C: couple)	Number of children	Age of children (1st age; 2nd age; etc)	Number of children living at home	Job (Professio nal activity)	Dwelling type (H: House - F: Flat)	Size of dwelling town A: <10000 inhabitants B: between 10000 and 50000 inhabitants C: >50000 inhabitants
participant 1	M	25	S	0	0	0	Computer Engineer	F	C
participant 2	W	25	S	0	0	0	Computer Engineer	F	C
participant 3	M	23	S	0	0	0	Computer Engineer	F	C
participant 4	M	35	C	3	10;3;1	3	Electrical Engineer	H	C
participant 5	M	28	S	0	0	0	Computer Engineer	F	C
participant 6	M	24	S	0	0	0	Computer Engineer	F	C
participant 7	M	35	C	0	0	0	Electronic Engineer	F	C
participant 8	M	33	C	2	6;2	2	Electronic Engineer	F	C
participant 9	M	54	C	1	14	1	Public Relations	F	C
participant 10	W	42	C	2	9;13	2	Mechanical Engineer	H	C
participant 11	M	46	C	1	18	1	Electronic Engineer	F	C
participant 12	M	50	C	1	18	1	Electrical Engineer	F	C
participant 13	M	25	S	0	0	0	Computer Engineer	F	C
participant 14	M	49	C	2	17;21	2	Mechanical Engineer	F	C
participant 15	M	33	C	1	8 months	1	Mechanical Engineer	F	C
participant 16	M	29	C	0	0	0	Computer Engineer	F	C
participant 17	W	29	S	0	0	0	User Interface Designer	F	C
participant 18	M	33	S	0	0	0	Computer Engineer	F	C
participant 19	M	25	S	0	0	0	Electronic Engineer	F	C
participant 20	M	24	S	0	0	0	Computer Engineer	F	C

Table 9: Profiles of the Turkish participants

6.3 Key words given by the participants to sum up their expectations

At the end of each interview, the participants to users' interviews had to give some key words to shortly sum up their expectations regarding "the home in the future". All these key words are listed in the table below and confirm a strong convergence in terms of expectations between countries.

	France	Germany	Turkey
Lifestyle / House management	Remotely Save time and convenience As if I was at home facilitate everyday tasks	remote control from everywhere media distribution cabled connection for everything (sauna management, etc)	Remote control Interaction remote access control household appliances remotely
Wellness	Comfort My house "always with me" (I'm always aware of its condition, I communicate with it) Safe, safely Secure More leasures, pleasure and emotions (thanks to technology) A secure cocoon adapted to my needs Security and confidence A house for our future (health, dangers, ecological) a house which cares of me (health, danger, intrusion), Be sure that my house is a safe and secure place	Save use of robots within my household comfortable living in a smart and intelligent home gain of comfort and control security	Security Monitoring Feedbacks Health Safe Comfort
Sustainability	Green Ecological no radiofrequency radiation both convenient for me and compatible with sustainability	energy efficiency	« Ecoist » (cares about environment) low cost energy saving energy efficient
Ergonomics	A house in my service, A intuitive smart home, Less constraints, more comfort Easiness, easily Toe the line Usefulness without gadget Convenient Helpful A simply and simplified life A house which is personalized according to my needs less logistical constraints in a house	Flexible Easy smart/user-friendly home userfriendly, understated	easy to use HMI useful Fast interpretive facilitator wieldy easy access answer to my request efficient accessible customizable
High-tech	High tech smart home, Technology Automated All what we see in advertising would become true the technology serves me Technology is totally in my service big screens, audio and video high definition communication ways more innovative (holography, "telepresence")	combine all technologies together, remote control, saving money with this new systems automation intelligent home intelligent system, automatic	Multimedia smart home auto control Connected Smart
Others	Integrated system > Thanks to a single integrated system, be able to monitor (remotely or not) my house, A smart home, with a single service in order to manage it Car > Take into account the car, which is more or less a part of the home	cost efficient reliable integration of E-Cars into the smart home system	privacy confidential personal compatibility low cost, profitable communication single device

Table 10: Comparison of the key words given by the participants of the different countries to sum up their expectations

7 References

- [1] HGI document: Home Gateway and Home Network Diagnostics Module Requirements, April 2013, available at http://www.homegatewayinitiative.org/publis/HGI-RD016_HG-Home-Network-Diag-Modul-Req.pdf
- [2] HGI document: Home Gateway Initiative Guideline Document: QoS White Paper, June 2009, available at <http://www.homegatewayinitiative.org/publis/HGI-GD013-R2.pdf>
- [3] http://animation.orange.fr/ge/content/rubriques/apropos/comuniques/CP_Orange_Fibre_en_100210.pdf