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Relaxed Care Consortium

Relaxed Care (AAL 2012-5-199.) is a project within the AAL Joint Programme Call 5
The consortium members are:

Partner 1	***AIT AUSTRIAN INSTITUTE OF TECHNOLOGY GmbH (AIT, Project Coordinator, AT)***
Contact person:	Martin Morandell
Email:	martin.morandell@ait.ac.at

Partner 2	***Hochschule Luzern Technik & Architektur – iHomeLab (IHL, CH)***
Contact person:	Martin Biallas
Email:	martin.Biallas@hslu.ch

Partner 3	***50plus GmbH (50p, AT)***
Contact person:	Cornelia Huis
Email:	cornelia.huis@50plusgmbh.com

Partner 4	***New Design University (NDU, AT)***
Contact person:	Sandra Dittenberger
Email:	sandra.dittenberger@ndu.ac.at

Partner 5	***Mobili (MOB, SI)***
Contact person:	Jure Lampe
Email:	jure.lampe@mobili.si

Partner 6	***Szenographie (SZE, CH)***
Contact person:	Ralph Eichenberger
Email:	contact@szenografie.com

Partner 7	***Ibernex (IBE, ES)***
Contact person:	Antonio Remartinez
Email:	antonio.remartinez@ibernex.es

Partner 8	***soultank AG (SOUL, CH)***
Contact person:	Bianca Redel
Email:	bianca.redel@soultank.ch

Partner 9	***Schweizerisches Rote Kreuz Luzern (SRK, CH)***
Contact person:	Beatrice Burch
Email:	Beatrice.burch@srk-luzern.ch

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Executive Summary

This deliverable shows a detailed analysis of existing pervasive user interfaces and ways of user interaction. Consideration is given to solutions of measuring data, representing data and the connection of user parties.

The presented, already existing solutions, are described within defined categories. Each solution is described and evaluated corresponding to positive or negative features regarding the development of prototype II.

1 About this Document

1.1 Role of the deliverable

To give an overview of technological developments and state-of-the-art examples of interaction cases between two parties, this deliverable presents already existing solutions of user interfaces and ways of user interaction.

While the focus of deliverable 5.1A was on evaluating available ambient and social awareness tools relating to product design criteria in general, deliverable 5.1B already addresses more elaborated technological solutions in order to benchmark the development of the RelaxedCare prototype II.

1.2 Relationship to other Relaxed Care deliverables

The deliverable is related to the following Relaxed Care deliverables:

Deliv:	***Relation***
D5.2B	This document supports the elaboration of RelaxedCare concepts and designs regarding the progression of the second prototype by presenting technological developments and state-of-the-art solutions.

2 Technology gadgets

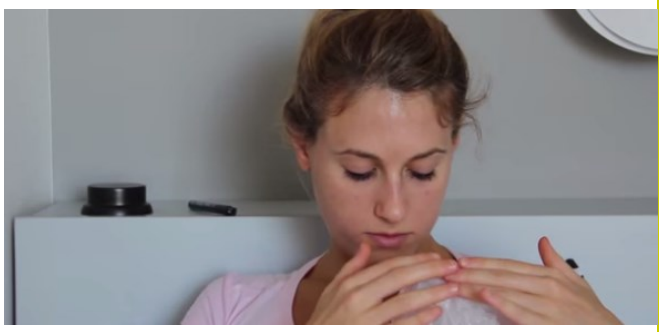
2.1 Introduction to this chapter

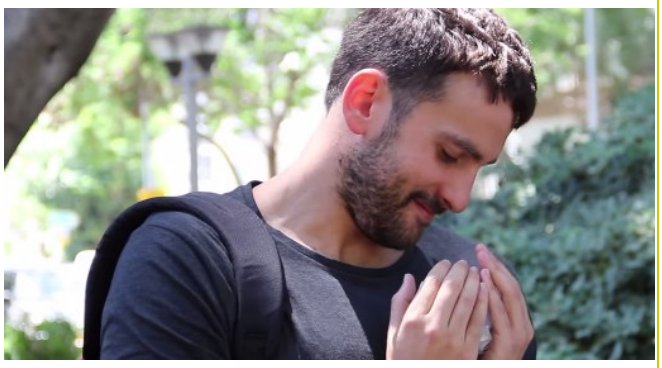
This chapter offers an overview of available technological gadgets which are categorized in gadgets bridging long-distance relationships, gadgets supporting communication and gadgets supporting everyday life. Furthermore there are pointed out gadgets with printable displays and customizable gadgets. The presented objects and solutions are described and valuated separately, relating to product design criteria with relevance to the elaboration of the second prototype of the RelaxedCare project.

2.2 Long-distance relationship

This chapter presents a students' project of the Holon Institute of Technology in Israel. The series uses a mix of technological and familiar objects to create a sense of presence between distant partners. There are three pairs of devices; the first one, heartbeat, is a pair of pineapple-shaped objects that "transmit" the heartbeat of one user to another. Another pair of devices enables one user to blow at a pinwheel, letting bubbles appear at the partners' side. The third device simulates "blowing a kiss" by flapping a paper butterfly`s wings.

Table 1: Long-distance relationship objects

Picture	Conclusion product design criteria +/-
Design proposal: I'm with you 	+ creates emotional bondage through movements + nifty and simple solution to transmit the message 'I think of you' + creating a live connection by touching the objects at the same time
	- mobile but not practical to carry around

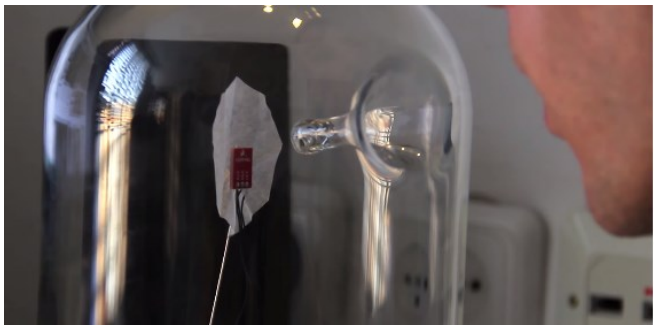


Design proposal: I-think-of-you

+ creates a subtle connection
+ playful approach
+ based on well-known objects

- one-directional communication
- no reaction via the same device possible
- one has to be present to watch the appearing bubbles
- not mobile

Design proposal: Blowing a kiss



+ emotional product design approach, by giving technology an appealing and innocent shape
+ is able to send a kiss by blowing into the glass bowl
+ playful approach
+ based on well-known objects

- one has to be present to see the butterfly flap

2.3 Communication support

This subchapter showcases an example of a technological gadget, which aims to simplify communication, by informing the carrier in case of an incoming call or message.

Table 2: Communication support gadget

Picture	Conclusion product design criteria +/-
	+ distinct product purpose + mobile tile + attachable on every handbag + removable - no interaction possibility - Restricted functionality

2.4 Support for everyday-life

“Support for everyday-life” introduces solutions which are characterized not only by their supportive functionalities but also by a modern lifestyle appearance. There are highlighted three showcases. The first solution presents context aware stickers, the second one is a sort of a caring solution and the third one is a fitness wrist watch.

2.4.1 Estimote Stickers

“Estimote Stickers” are small wireless sensors that are attachable to places or objects and add contextual intelligence to those places or objects. That information e.g. signals can be picked up by a smart phone via an app which is able to understand the proximity to nearby locations and objects, the ownership, temperature, motion and other data.

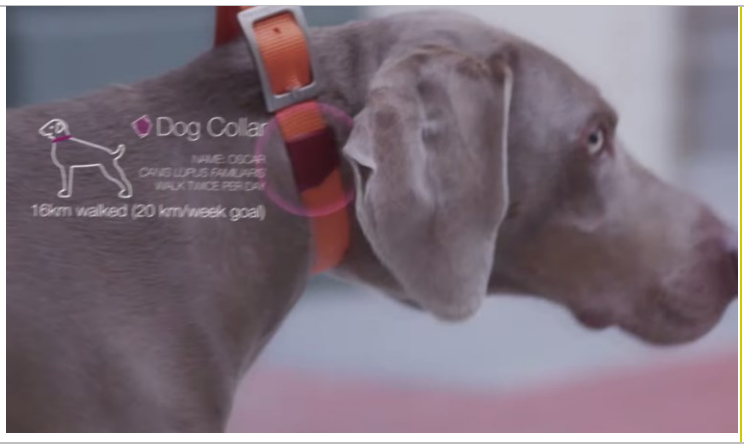
Table 3: Support for everyday-life: Estimote stickers

Picture	Conclusion product design criteria +/-
	+ unobtrusive + the design of the sticker objects is aesthetically appealing + measurement of data - no interaction possible - no emotional design factor in this object

Showcase Flower Pot

Showcase Customer interaction and statistics

Showcase Dog Collar

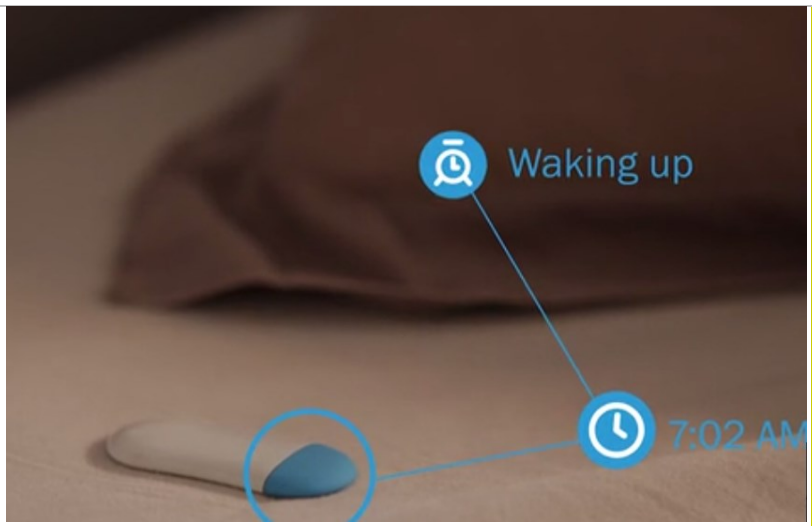


2.4.2 Mother

"Mother" consists of a body and several smart sensors that are set to perform actions that could be defined by its users. If e.g. a sensor is affixed to a water bottle it is able to remind the user to drink water regularly. It's also a device to connect more clients with each other. If you for instance add a sensor at someone's key (key of the kid), mother (the gadget) detects that the person came home if it passes it with the key and a message is sent to another user (father) that the person arrived at home.

Table 4: Support for everyday-life: Mother

Picture	Conclusion product design criteria +/-
	+ suitable as informational / interactional system in people's daily life + unobtrusive presentment of family members activities + aesthetical appearance + material and haptic + sensors as mobile parts + measures and interprets data and acts based on the data gathered - one-directional communication - no interaction possible



2.4.3 Fitness Watch

The fitness watch is an example of a fitness and activity tracking tool, amongst the widespread market of available tracking products. It supports its carrier in performing his training in an intelligent and efficient way, through the registration of gps-data, heart rate, daily activities and sleep surveillance, visualized and presented in several ways and facilitated by statistical overviews.

Table 5: Support for everyday-life: Fitness Watch

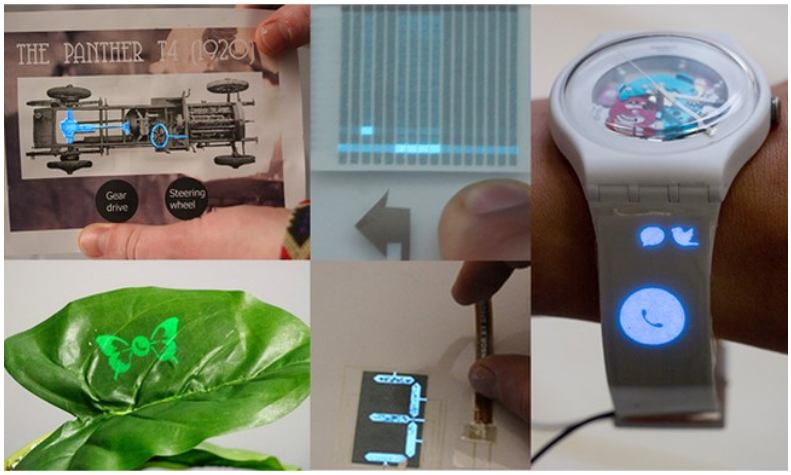
Picture	Conclusion product design criteria +/-
	+ suitable as information system in peoples' daily lives + unobtrusive display of activities + aesthetical appearance + wearable + mobile + measures data and interprets data, e.g. providing statistical

	analysis - one-directional communication - no interaction possible
	

2.5 Printable displays

"PrintScreen" is a technology to produce customized flexible displays, by using thin-film electroluminescence. It's an inexpensive and rapid tool to fabricate highly customized displays in low volume in a simple lab environment, print shop or even at home. The displays can have customized, unconventional 2D shapes or can be bent, rolled and folded to create 3D shapes.

Table 6: Printable display

Picture	Conclusion product design criteria +/-
	+ suitable as information system in people's daily life spac + unobtrusive appearance + wearable + mobile + lightweight + scalable + transparent + flexible + can be mounted everywhere + individualized + simple + inexpensive
	
	

2.6 Customizable round smart phone

The idea behind the customizable, round smart phone “Runcible” was born out of an antipathy regarding smart phones usual in trade, as those create an environment that can affect social interactions with people around negatively, creating an atmosphere of being reachable all the time, not to miss a thing. Built to last and evolve, each Runcible is unique to its owners needs and taste. It's a smartphone and an anti-smartphone at the same time. Equipped with a circular display, and no buttons or even speakers, it could only be used as a phone, if it’s combined with a speaker and headphones. In that sense, Runcible distils the smart phone to its essence, as a device that can keep someone connected without the constant need to be connected to the device. Its creator emphasises that he wants to create the effect of an "heirloom" that can keep up with technological innovation. It’s individualized as its users are allowed to exchange processors or camera modules and therefore it might attract people, who feel overwhelmed by constant notifications and virtual obligations.

Table 7: Customizable round smart phone: Runcible

Picture	Conclusion product design criteria +/-
	+ suitable as information system in people’s daily life space + unobtrusive, reduced appearance + wearable + mobile + lightweight + scalable + individually adjustable + flexible + modular + user serviceable

2.7 Summary of the chapter

This chapter presents an overview of existing solutions in terms of user interfaces and ways of user interaction, describing the functions and evaluating positive and/or negative design aspects. Every solution contains single aspects that might be considered when prototype II is developed.

The printable display for example stands for a new technological approach that enables users to print displays with their required functions included themselves, even at home. All these examples are focusing on a customer friendly and, in different occurrences, autonomous usage.

3 Life Tools

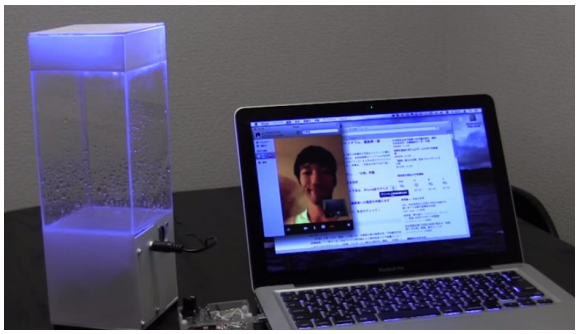
3.1 Introduction to this chapter

This chapter offers an overview of life tools which are either within the process of development or already on the market. There are two categories defined, namely ambient environment information, and personal adjustable product. Each category contains a specified example of a product, whereby the presented objects are described and evaluated relating to criteria of product design in relevance to the development of the second prototype of the RelaxedCare project.

3.2 Ambient environment information

The tempescope is an ambient physical display that visualizes various weather conditions like rain, clouds, and lightning. By receiving weather forecasts from the internet, it can reproduce tomorrow's sky in the living room.

Table 8: Ambient environment information: The tempescope

Picture	Concept aspects relevant for the RelaxedCare Project +/-
	+ suitable as informational system in people's daily life space + mobile as it may be moved + creative and funny visualization of weather data
	- not individually adjustable - no interaction possible

3.3 Personal adjustable product

The presented table light “hue” provides immediate and complete control over the home illumination. It can be integrated in the wireless home network and controlled via smart phone.

Table 9: Personal adjustable product: Table light “hue”

Picture	Concept aspects relevant for the RelaxedCare Project +/-
	+ unobtrusive adaption to mood situations + aesthetical appearance + material and haptic - one-directional communication
	

3.4 Summary of the chapter

This chapter offered an overview of existing solutions in terms of user interfaces and ways of user interaction, describing their functions and evaluating positive and/or negative design aspects. Every presented solution contains single aspects that might be considered for the development of prototype II.

The two presented life tools are home objects that are linked to internet services and smart phones. Whereas the tempescope reacts on previsions from the internet and translates them into a real time weather simulation, the table light “hue” is adjustable according to the current mood of its users.

4 Care Support

4.1 Introduction to this chapter

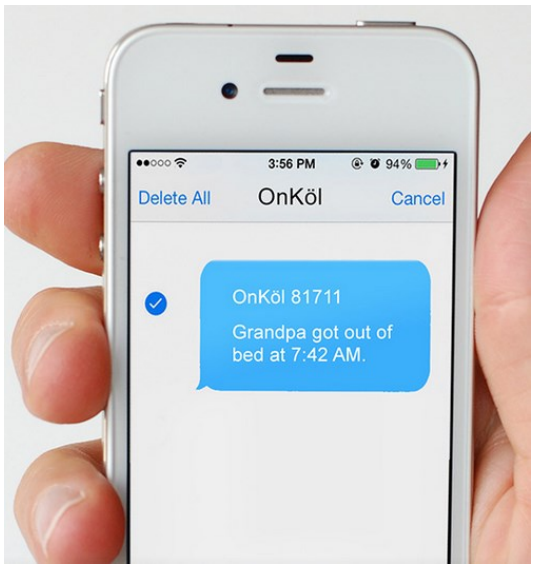
This chapter offers an overview of available care support solutions. Those are categorized in pervasive user interface tools, home services and products. The presented objects and solutions are in each case described and valuated relating to criteria of product design, and their relevance for the second prototype of the RelaxedCare project.

4.2 Pervasive user interface tool

“OnKöl” is a device that connects elderly people and persons with special needs with their family members and caregivers, allowing them to continue to live independently in their own homes. OnKöl informs selected family members and other caregivers simultaneously about vital signs, incoming and outgoing calls, and potential emergency or panic situations. The idea behind that is to enable caregivers and interested parties to react to critical situations as they occur, and before they become full-blown emergencies. Through the use of motion and other sensors OnKöl tracks, if the assisted person is at home, where he or she is (for example in or out of bed), and if there is a problem inside the house (like the occurrence of carbon monoxide), and sends notifications to all the desired parties. It can be programmed to remind the assisted person to take its medication(s) and notifies selected caregivers, if a dosage was missed. Through the included wireless pendant, OnKöl serves as an emergency response tool, notifying family members, if immediate attention is required. If requested, an optional connection to an emergency response operator can be added, which is advisable, if family members cannot be reached all the time. OnKöl uses Caller ID to track who is calling, and via Bluetooth or USB cable it can be connected to various medical devices, like blood pressure cuffs, glucose meters, heart-rate monitors, scales and many more. OnKöl collects the data, communicates it to the selected person(s), and stores it for later use. OnKöl can be taken into operation without professional installers, and expanded to master new situations. It can be programmed to contact a variety of family members via text or e-mail simultaneously, or in a set order, and additionally it offers the option to contact a 24-hour staffed call center, if family members cannot respond.

Table 10: Pervasive user interface tool: Onköl

Picture	Concept aspects relevant for the RelaxedCare Project +/-
	+ modular system + expandable system + aesthetical appearance + establishes and structures a family network regarding care situations + no external professional installers needed - no interaction between user and device - one way communication


3:56 PM
94%
Delete All
OnKöl
Cancel
OnKöl 81711
Grandpa got out of bed at 7:42 AM.


ONKOL

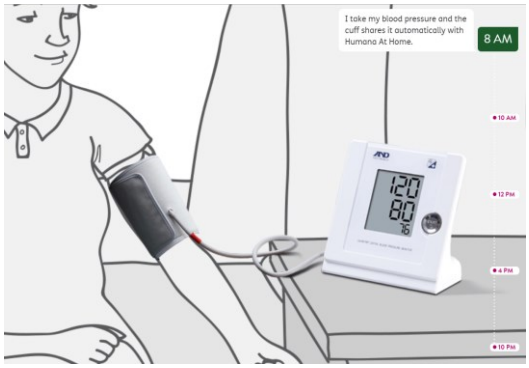
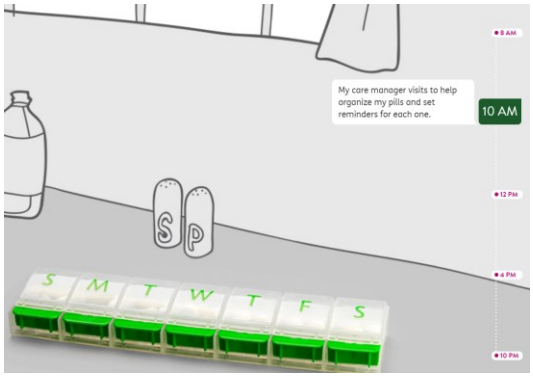
4.3 Home services and products

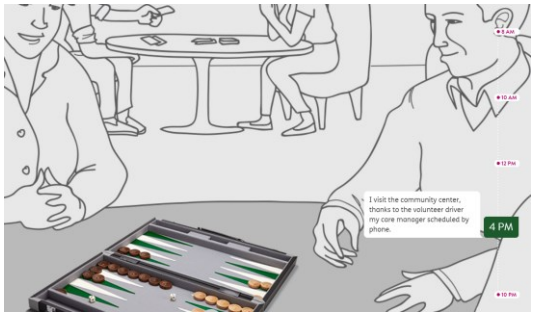
"Humana" offers a range of personal care management and in-home care services which make it simpler, more comfortable, and affordable for people with special needs to stay in their own homes. If a person needs assistance to manage living at home, a "Humana At Home care manager" offers support. Humana At Home care managers can:

- call or visit the assisted person to keep in touch
- arrange social services like transportation or grocery and meal deliveries
- set up activity goals and offer the support to reach them
- supervise the correct taking of medications
- accompany clients to doctor's appointments, assisting them in understanding diagnoses and following courses of treatment
- send updates of the assisted persons states to family members
- provide home-based technologies that surveil the clients somatic functions to detect health risks quickly
- provide motion around the house technologies for a save home
- host meetings to inform family members about changes within the clients health situation and to discuss possible steps to improve it
- offer hands-on help with legal issues (housing, insurance, and financial issues)

The following table shows a typical day with the support of the care manager.

Table 11: Home service and product: Humana At Home care manager

Picture	Concept description
	Possibility to control and share health data
	Support with daily medication

	Visit of in-home care support – also with delivering groceries
	This concept also offers the possibility to bring people to different locations for social activities
	The elderly person can go to bed with the help of SeniorBrigde reassured of its own safety.

4.3.1 Lively sensor system

The Lively-system enables caregivers to affix sensors, equipped with motion trackers, to monitor the movement of objects at the assisted person house to observe daily routines.

Table 12: Home service and product: Lively sensor system

Picture	Concept aspects relevant for the RelaxedCare Project +/-
	+ measurement of activity and movement - no additional context information (home or personal)

4.3.2 Medication monitoring

Adhere Tech has developed a pill bottle that sends voice or text messages to remind patients that it´s time to take their medications. This works, because embedded sensors track when the bottle is opened and how many pills are taken. If the patient doesn't take the pills, although he was reminded by the system, an internal cellular transmitter can send a notification to caregivers to inform them that the doses were missed.

Table 13: Home service and product: Medication monitoring

Picture	Concept aspects relevant for the RelaxedCare Project +/-
	+ measurement of activity and movement - no additional context information (home or personal)

4.4 Summary of the chapter

This chapter offers an overview of existing solutions with reference to interfaces and ways of user interaction, focusing on their functions and evaluating positive and/or negative design aspects. Each presented solution contains single aspects that might be considered for the development of prototype II.

Through the review of these projects and gadgets the question occurred, how the user interaction and the technology acceptance of the key users would work out in daily routines.

5 Conclusions

This deliverable offers an overview of user interfaces and requirements for new interfaces, represented by the categories

- technology gadgets,
- life tools,
- and care support solutions.

The presented objects and solutions are described and valuated respectively to criteria of product design and their relevance for the development of the second prototype of the RelaxedCare project.

Summarizing the presented examples, the emotional factor in product design will presumably be the main challenge, when it comes to the creation of prototype II. The solutions, presented in the second chapter of this deliverable, facilitate to visualize emotional states and to share them with others, as well as the measuring of personal life data. Reviewing these proposals, the possibility to communicate emotional states can be seen as an important demand of users. Nevertheless it is noticeable that these projects do not allow its network of users to share additional information about each member. Secondly, the projects that deal with the measurement of personal life data, don't offer ways to interact with the device or communicate with each other. Especially the project OnKöl, which can be clearly identified as the one, with the most similar goal settings to the RelaxedCare project, does not offer the possibility for elderlies to interact with their families through the device. Although the realization of it supplies various features to brief family members about wellbeing states of assisted persons, it is still a one-way communication tool. Still a plus is its modular expandable system, which is delivered in a box and does not require any external professional installers, and the collection and transmission of health data.

After this analysis the question, what the motivation for a family to buy such a product could be, is still prominent. Apart from the fact that families should be reassured that everything is fine, and that the elderly family member is doing well, there is no additional motivator to buy or use such a device.

To conclude the outcomes of the analysis of the presented examples aspects regarding

- user ethics,
- design for emotion,
- individualization,
- and user interaction could be identified as key criteria for a new product development.

Although there are some products already placed on the market or will be placed soon, it is still challenging and necessary to create the motivation for the target group to buy and use them. Applying a user-centered design approach means to support people within their everyday life management and not to complex it. Therefore the value added within the usage of such devices has to be transparent and evident to potential users and costumers. The result of this research project, with its system in a box, should be represented by a meaningful name of the device.

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