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Platform for Ergonomic and motivating,
ICT-based Age-friendly woRkpLaces

Document Identification

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Abbreviations

<i>Abbrev.</i>	<i>Description</i>
AAL	Ambient Assisted Living
AAL JP	Ambient Assisted Living Joint Programme
CEO	Chief Executive Officer
CIO	Chief Information Officer
ESM	Experience Sampling Method
HR	Human Resources
ICT	Information and Communications Technology
NUF	New – Useful – Feasible
SME	Small and medium-sized enterprises

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Executive Summary

This deliverable presents the results of the requirements analysis of the PEARL project. In order to develop solutions matching the needs of older employees we directly involved potential end users as well as relevant stakeholders within their companies in Romania, Switzerland and the Netherlands. We present methods, results and implications of the requirements analysis with end users in chapter 2 and with stakeholders in chapter 3.

For analysing needs of older employees we conducted 19 context interviews and observations directly at their workplaces as well as an Experience Sampling study with 6 participants over a period of one week. The goal was to gain bottom-up insights into the work realities and contexts of older employees. Specifically, we wanted to get an overview on typical processes and tools used by our target group and identify needs and frictions in the workplace. These insights will be used as input for an ideation workshop, which shall yield a list of feature ideas for a smart workplace environment (see D2.2). In total 96 insights segmented into seven themes were derived from the analysis of the interview / observation data collected at the three pilot companies in PEARL. Most insights were obtained for the themes task management and mind & body (21 each), followed by tools (17), work conditions (15), personal development (10), communication (7), and collaboration (5). The insights vary in the type of solutions they suggest. Some allow for very creative solutions, while others suggest more straight-forward solutions. For example, the insight 'I need to write proper Romanian but the default English keyboards come without diacritics' does not require any new development but can be addressed simply by buying Romanian keyboards. Moreover, some insights are obviously related and thus suggesting similar solutions. For example, the insights 'I need to share information digitally but there is no efficient way of digitizing hand-written information' and 'When I do analysis on paper then I have to digitize my work. It makes me lose time for sure' could be addressed by the same solution.

Although PEARL's primary target group are older employees, their colleagues, supervisors and other people in the company will both be involved in its application and affected by changes introduced through it. Also, members of these groups were considered to hold important knowledge about business processes, people's habits and other factors that are likely to have an impact on how PEARL can be applied within a given company. In order to elicit requirements of other stakeholders, a total of 13 interviews and three focus groups were conducted. Results showed that there exist a number of issues arising from the employment of older people in the companies. One topic emerging frequently and from a number of interviews relates to changes in business processes and older employees' capacity to adapt to such changes, which was said to be lower than for younger employees by several interviewees. Training as a means to facilitate older employees' participation in working live but also improved communication in teams and between management and team were seen as potential solutions. Several interviewees stated that they see a special need among older employees to work with applications offering user-friendly interfaces. The results of the stakeholder analysis are mapped against the feature ideas derived from the end user insights in order to provide either additional insights for development or a further means to prioritize features (see D2.2).

1 About this Document

1.1 Role of the deliverable

This deliverable contains the definition of the PEARL end users and relevant stakeholders. Thus, it influences all other deliverables of the project at least indirectly. The results of the requirements analysis that takes needs and wishes of end users and stakeholders into account are the basis for the specification phase of PEARL. This means that this deliverable has a strong influence especially on the work that will be published in D2.2, D2.3.1, D4.1 and D4.2 (see next section 1.2).

This deliverable and D2.2 have been written in parallel as the requirements analysis influenced the PEARL scenario creation and the feedback of the stakeholders was set in relation to the feature ideas and specifications.

1.2 Relationship to other PEARL deliverables

The deliverable is directly related to the following PEARL deliverables:

<i>Deliv:</i>	<i>Relation</i>
D2.2	Use Cases, Scenarios and Integrated Functionalities: The results of the requirements analysis are the base for the upcoming specification phase and thus have a direct influence on the definition of scenarios and use cases.
D2.3.1	First PEARL User Interfaces: The results of the requirements analysis are the base for the upcoming specification phase and thus have a direct influence on the design of the PEARL user interfaces.
D4.1	System Architecture Specification and Implementation: The results of the requirements analysis are the base for the upcoming specification phase and thus have a direct influence on the definition of the system architecture.
D4.2	User, Tasks and Workspaces Databases, Ontologies and Knowledge Bases: The results of the requirements analysis are the base for the upcoming specification phase and thus have a direct influence on the modelling of the PEARL entities.

2 End User Requirements

2.1 Description of PEARL End Users

The focus within PEARL is on the development and deployment of ICT-based age-aware work spaces to support a prolonged, productive and satisfactory involvement of older employees in working life.

The envisioned end users of the PEARL platform are experienced knowledge workers at the later stages of their working life (roughly aged 50 and above) who work predominately in the creative industries, such as design, information technology, research & development, and education. As knowledge workers they all rely on a computer to support them in their daily tasks, using it for a range of common activities and tasks. Such common activities and tasks include, but are not limited to, correspondence via email, communication via VoIP and instant messaging services, managing appointments and to-do's, word processing, spreadsheets, and preparing presentations.

Importantly, within PEARL the focus is on developing general solutions to support end users in those common activities and tasks. Highly specific activities and tasks, for example end users who need specialized software or tools in order to do their job, are not the focus as they require very specific solutions that address the needs of only a small subset of end users.

For gathering the end user requirements reported in this deliverable, end users working for the three test sites in three countries participated in the research: SingularLogic in Romania (n = 8), RRD in the Netherlands (n = 6), and COMARG in Switzerland (n = 5). The involved end users worked in the following domains: information technology, (higher) education, research & development, health care, retail business, and consulting.

2.2 Deriving End User Requirements

2.2.1 Goal and Research Questions

The main goal of the research presented in this chapter was to gain bottom-up insights into the work realities and contexts of older employees. Specifically, we wanted to get an overview on typical processes and tools used by our target group and identify needs and frictions in the workplace. In addition, we wanted to identify the activities that provide energy and motivate older employees to do their job. The positive design of Anna Pohlmeyer intends to increase people's subjective well-being and has been used to identify energizing and motivating activities (Desmet & Pohlmeyer, 2013). These insights should help in deriving innovative feature ideas for the PEARL system that are accepted and appreciated by the users.

In line with the overall goal of providing feature ideas as input for the technical specification of a smart work environment for older people, we followed a multi-method approach as depicted in Figure 1 below.

As a starting point, we aimed at gaining bottom-up insights into the work environments of older computer workers with the help of Contextual Interviews and Observations. Inspired by ethnographic approaches (e.g., see Blomberg & Karasti, 2013; Crabtree, Rouncefield, & Tolmie, 2012; Leonard & Rayport, 1997) we analyzed the work environment as a whole, utilizing a combination of semi-structured interviews and observations (see 2.2.2.1) and experience sampling (see 2.2.2.2).

The goal of the second phase was to identify needs, frictions and activities that provide energy from the interview transcripts and observation reports, which were then combined to form insights (see 0). The goal of the third phase (not in this deliverable, will be covered in D2.2) is to derive feature ideas based on these insights by conducting an ideation workshop.

The goal of the fourth phase, the NUF-Prioritization Survey (will be covered in D2.2), is to prioritize these feature ideas in an online survey among experts by having them evaluate the features on the dimensions of newness, usefulness, and feasibility.

Finally, in a next phase the resulting output can be used for the creation of mock-ups to gather valuable feedback from our target group.

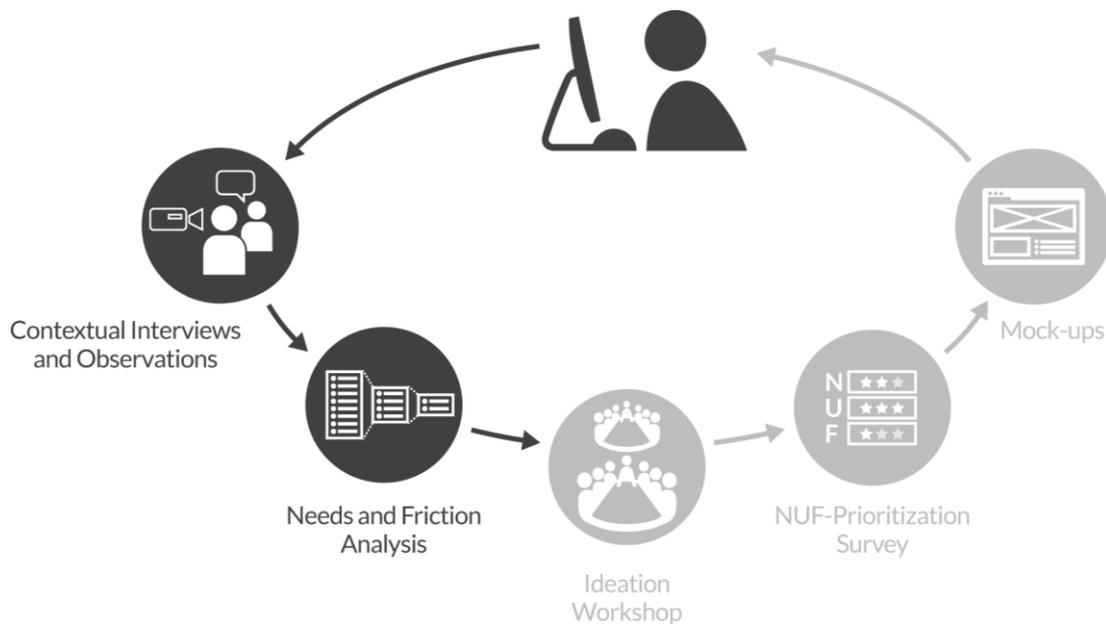


Figure 1 Overview of the phases in the multi-method approach. Black circles represent the phases covered in this deliverable, grey circles represents future work.

2.2.2 Methods Applied

2.2.2.1 Contextual Interviews and Observations

Participants and Setting. The contextual interviews and observations were conducted in Romania, The Netherlands, and Switzerland. In the following we briefly describe the samples in the three countries.

Romania: Eight participants (two women) belonging to the target group of older computer workers volunteered to take part in the contextual interviews and observations (see Table 1). The mean age of participants was 55 years ($SD = 3.93$). All participants were Romanian and recruited from two small to medium sized IT companies from Bucharest.

Table 1 – Details of the Romanian Participants

#	Gender	Age	Organization	Function	ESM*
1	M	57	SingularLogic	ERP consultant	—
2	F	56	SingularLogic	Country Manager	—
3	M	62	Accord	Laboratory Services Technician	—
4	M	54	Accord	Analyst Programmer	—
5	F	50	Accord	Administrative Manager	—
6	M	57	Accord	Administrator	—
7	M	49	Accord	Sales Manager	—
8	M	57	Accord	Commercial Assistant	—

The Netherlands: Six participants (one woman) took part in the study (see Table 2). The mean age of participants was 58 years (SD = 3.43). All participants were computer workers. One participant had his own business (a computer shop), one worked as a consultant for the local government in his home town, the others worked in research (at a University and a non-university research institute).

In general, the Netherlands has many workers being self-employed without personnel (in Dutch: ZZP = zelfstandige zonder personeel) instead of being employed by a company. Of the total employees in the Netherlands in 2013, 12.7% of the men (506,000) and 8.5% of the women (278,000) are ZZP (as reported by the CBS (2013)). In total, 11% of all employees in the Netherlands are self-employed without personnel. This is a substantial percentage of the employed labour force and should therefore be taken into account with the development of PEARL. The system should be available and affordable for this category of employees.

Table 2 – Details of the Dutch Participants

#	Gender	Age	Organization	Function	ESM & PA*
1	M	56	University of Twente	Head of business information management	5 days
2	F	61	RRD	Management assistant	4 days
3	M	59	The local government of the city of Hengelo	Architectural consultant for age-related home modifications	5 days
4	M	59	ARTRAS	Owner of a computer shop	5 days
5	M	52	RRD	Senior researcher	5 days
6	M	54	RRD	Scientific director	5 days

Switzerland: Five participants (one woman) took part in the contextual interviews and observations (see Table 3). The mean age of participants was 62 years (SD = 4.64). All participants were using computers for their work on a daily basis. One worked as a nurse in a

hospital, one in education, two in business / economics, and one as a consultant for small and medium-sized enterprises (SMEs).

Table 3 – Details of the Swiss Participants

#	Gender	Age	Organization	Function	ESM*
1	M	66	Phone Marketing SA Lausanne/Fribourg	Founder - Marketing expert	—
2	M	68	TWBTT GmbH	Economist/Treuhand/Former IT teacher	—
3	M	58	Haut Ecole d'Ingénierie et de Gestion du Canton de Vaud (HEIG-VD) Yverdon	Dean of HEIG-VD, Head of Training	—
4	M	59	Climate Action NGO - Stidt	Consultant of SMEs, Lead auditor ISO, responsible for training pathway	—
5	F	59	CHUV – University Hospital of Lausanne	Head of Nurse Service	—

In all three countries the interviews and observations took place directly at the participants' workplace within the context of their normal office environment (see Figure 2–4 for an illustration). The duration of the contextual interviews and observations varied between 1 and 1.5 hours per participant.



Figure 2 Example of one participant's workplace and setting in Romania.



Figure 3 Example of one participant's workplace and setting in Switzerland.



Figure 4 Example of one participant's workplace and setting in The Netherlands.

Instruments and Equipment. The research instruments used included an interview guide that provided a rough structure and served as a backup for questions we wanted to cover during the contextual interviews and observations. In terms of technical equipment, a smartphone was used to capture video and audio. The choice for using a small unobtrusive smartphone camera rather than a more professional dedicated camera was made deliberately, so that participants would not feel intimidated and quickly forget about the presence of the camera.

Procedure. Each session with a participant started with an informal conversation to warm up, in which we introduced ourselves and provided general information about the goals and procedure of the research. Following this warming-up, we handed out informed con-

sent forms that participants could read at their pace and ask questions at any time. Only after participants had signed the informed consent, we started recording and proceeded with the contextual interviews and observations. In line with the open character of our approach, we relied on a loose structure in which we defined certain aspects (e.g., approximate duration of the interviews, general setting, and topics of interest), yet making sure that participants still had enough leeway to act and speak spontaneously. Participants were encouraged to present their work environment and their typical tasks in a self-paced, active manner. Behavioral prompts (e.g., “Can you show us around your desk?”) and follow-up questions (e.g., “You mentioned that you prefer to take down appointments in a physical calendar. Why is that?”) were used to subtly direct the attention to specific aspects.

In order to get the most out of an observation and to gain valuable insights, it is usually recommended that the researchers (members of the ethnographic team) each bring in a different expertise / background. For example, somebody with a background in human-computer interaction may be able to derive an interesting insight from observing a workaround used for a problem that users have gotten used to already and are thus not aware of anymore. Observing the same workaround, somebody with a background in health sciences may come up with yet another insight leading to a promising new feature. Thus, in each of the three countries the contextual interviews and observations were conducted by a team of two researchers with a varied set of skills and expertise. Backgrounds included the following domains: human-computer interaction, design, psychology, cultural studies, economics, biomedical engineering, and health sciences. The team in Romania was further supported by a local interpreter who was crucial in overcoming cultural barriers, building rapport, and generally making sure that nothing got lost in translation. The researchers spoke English, the participants answered either in English or Romanian, based on their own preferences.

2.2.2.2 Experience Sampling

In the Netherlands, in addition to the contextual inquiries, Roessingh Research and Development (RRD) used an Experience Sampling (ESM) app to gather information about experiences and emotions in the real work context. Participants received an Android smartphone in which this app was already installed. Every hour they received a prompt to participate in a short survey about their current work activities and corresponding feelings. Each survey comprised the following questions:

- What is your current activity?
- With whom did you perform this activity? (colleague, manager, ..)
- Where did you perform this activity? (own office, meeting room, ..)
- How did you feel while performing the activity? (relaxed – stressed)
- Did you like (to perform) the activity? (not at all – very much)
- How much effort did it take to complete this activity? (none – very much)
- How much energy did you get from performing this activity? (none – a lot)

At the end of each (work)day the participants received a final question: “how satisfied are you with your day?” This provided a summary score for their satisfaction that day. In addition to the smartphone with ESM application, participants received an accelerometer, which tracked their physical activity during waking hours on workdays. Each participant used this combination of the ESM app (see Figure 5) and accelerometer (see Figure 6) over the duration of five working days. Participants were free to choose on which day of the week they started monitoring.

This provided us an overview about the physical activity and tasks performed by the participants and their mood when performing these activities, but also information on which activities tend to reveal positive experiences and which activities negative ones.



Figure 5 Screenshots ESM application



Figure 6 RRD Activity monitoring system

2.2.2.3 Needs-Frictions Analysis

Data Preparation. More than 10 hours of video material was transcribed using the open source software easytranscript¹. For those participants who answered in Romanian, only the English translations were transcribed. All names and other personal information were anonymized.

Data Analysis. The goal of the analysis was to identify *needs* and *frictions* from the interview transcripts, observation reports and activity measurements, which were then combined to form insights. For our purposes, we defined needs as something required in the execution of work, frictions as a certain issue that stands in the way of satisfying a need, and insights as an intuitive grasp of a need–friction situation (e.g., ‘I need to meet objectives but sometimes I forget them.’). Energy providing activities are activities that motivate the employees to execute work tasks and naturally provide energy. The analysis of the data involved two steps:

– Step 1: Reading the transcripts, highlighting relevant utterances and observations, and categorizing them to themes (i.e., certain recurring patterns). For example, “staying in touch with distant colleagues” and “being stressed by the daily email load”, would both be coded to belong to the theme *communication*. The themes (see – Step 2: After categorizing the relevant utterances and observations to themes, we identified underlying needs, frictions and energizing activities. Insights were formed by combining a specific need with a specific friction or energizing activities and formulated from the perspective of an older computer worker (e.g., ‘I need to communicate via email but I cannot handle the high email load’). In some cases, more than one insight could be identified for a specific need due to several frictions for the same need.

Table 4 below and Table 5 in the results) structured the process of identifying the needs, frictions and energy providing activities.

– Step 2: After categorizing the relevant utterances and observations to themes, we identified underlying needs, frictions and energizing activities. Insights were formed by combining a specific need with a specific friction or energizing activities and formulated from the perspective of an older computer worker (e.g., ‘I need to communicate via email but I cannot handle the high email load’). In some cases, more than one insight could be identified for a specific need due to several frictions for the same need.

Table 4 – Themes and Definitions

Theme	Definition
<i>Task Management</i>	Managing tasks & time, executing tasks
<i>Communication</i>	Communication with colleagues and / or others, communication assisted by technology

¹ www.e-werkzeug.eu/index.php/en/

<i>Collaboration</i>	Working with others, common tasks / goals, sharing information
<i>Mind & Body</i>	Mental and physical health, nutrition, relaxation, exercises
<i>Work Conditions</i>	Work conditions imposed by office environment and company policies
<i>Personal Development</i>	Education, training, self-actualization
<i>Tools</i>	Useful tools needed in conducting work

2.2.3 Results

Our comprehensive multi-method approach (see Figure 1) allowed for gaining bottom-up insights into the work realities of our target group, which were combined to form insights in a needs–frictions analysis. Insights from the contextual interviews and observations will be used as input for the next phase in the multi-method approach, the ideation workshop, which shall yield a list of feature ideas for a smart workplace environment (see D2.2). In this deliverable, the focus is on reporting the insights that resulted from the contextual interviews and observations, experience sampling, and the needs–frictions analysis.

2.2.3.1 Insights from the Needs–Frictions Analysis

Table 5 features all the insights for each theme that resulted from a needs–frictions analysis of the contextual interview and observation transcripts in Romania, the Netherlands, and Switzerland. In total 96 insights were derived from the analysis of the interview / observation data. As can be seen from the table below, some insights leave ample room for creative ideas (e.g., ‘I would like to train general skills but the company does not foster it.’) while others are so straight-forward to suggest an easy solution (e.g., ‘I need to write proper Romanian but the default English keyboards come without diacritics.’). Some are so general that smart workplace solutions cannot help (e.g., ‘I don’t want to work at home but sometimes I have to.’).

Table 5 – Themes and Insights from the Contextual Interviews and Observations and the Needs–Frictions Analysis in Romania, the Netherlands, Switzerland.

Note. The insights were synthesized from the needs, frictions and energizing activities analysis and formulated from the perspective of a user. Quotation marks are used to indicate utterances that originated directly from participants

<i>Themes</i>	<i>#</i>	<i>Insights</i>
Task Management	i01	I need to keep track of open tasks but carrying them over (e.g., from my agenda to Outlook) takes effort.
	i02	I need to meet objectives but sometimes I forget them (“Out of sight, out of mind”).
	i03	I don't want to work at home but I have to.
	i04	I cannot work at home because I don't have the necessary equipment.
	i05	I need to work from home but have to use my own devices.
	i06	I want to archive information but there is no backup system for

	that.
i07	I have to work on urgent tasks first but struggle with prioritizing.
i08	I have a lot of distraction in my work (like colleagues asking short questions, and phone calls), which takes a lot of unnecessary time.
i09	It was hard for me to get used to the fact that I needed to share a room with a colleague, while I had an office for myself in my previous job.
i10	I do not like to take notes, because elaborating them takes a lot of time. After a long meeting I am already tired and especially then I need my concentration to formulate a coherent story which is even more exhausting.
i11	Staying focused is harder when there is a lot of distraction from colleagues walking in and phone calls which I have to answer for both me and my colleague with who I share the office.
i12	I find it difficult to structure time demanding tasks (e.g. repairing technology) vs. ad-hoc questions of customers.
i13	Appointments are scheduled for me, without enough time between them. Too many appointments on a day. I need time between meetings to process information and execute forthcoming tasks.
i14	I took the initiative to implement the Getting-Things-Done (GTD) methodology in Outlook, as I want to learn how to further structure long and short term tasks. So I can function more efficiently.
i15	In the past I sometimes did not meet the deadlines as I wanted to deliver 'too good or beautiful' products. I learned from these experiences and try to work on it.
i16	My day plan can be easily changed by unforeseen interruptions, like a phone call resulting in an urgent task or a colleague walking in with a question. I don't mind this, as long as it is within certain time-boundaries.
i17	Every morning I try to set the goals for the day and prioritize them. The day is over when at least the most important goals are achieved.
i18	I prefer to manage my to-do lists and documents digitally, so I can easily combine them with my personal notes.
i19	It would be nice if there was an easier way to compare my own private agenda with my work agenda; this would make it easier to plan appointments.
i20	My family finds it more difficult to keep work and private separate and disturb regularly with brief questions.
i21	I look on my to to-do list what needs to be done and then I start the day. Sometimes I have enough time to finish it all and some-

		times I do not.
Communication	i22	I want to be able to send instant messages to both private and business contacts but without mixing contacts.
	i23	I need to communicate via email but I cannot handle the high email load.
	i24	I need to stay in the loop with distant colleagues/partners but traveling to face-to-face meetings costs time.
	i25	I need to gain/maintain trust of clients but the face-to-face meetings cost a lot of time.
	i26	I need to know what to do but depend on the presence of my superior for that ("If he is not there, I don't know what to do").
	i27	I like to have contact with colleagues, but I am traveling a lot or working on other places.
	i28	There needs to be a more informal way to communicate with colleagues, other than by e-mail.
	Collaboration	i29
i30		I need to share information digitally but there is no efficient way of digitizing hand-written information.
i31		I like having contact with lots of different people but there are not enough opportunities.
i32		Sharing experiences is beneficial for both older and younger colleagues, but my organization currently does not facilitate such cross-generational exchanges.
i33		I like to share new things I find on the internet on our work domain with colleagues, but email is too formal for that.
Mind & Body	i34	I want to train my mind but I don't know how to do it effectively ("To train my mind I'm reading, solving crosswords, and checking Facebook").
	i35	I need to take breaks but since I stopped smoking I remain mostly at my desk.
	i36	I need to see clearly at far and close distances but need two types of glasses for it.
	i37	At my age I need to increase circulation to stay fit but I struggle in motivating myself ("Even a short dance might be a good idea.")
	i38	I need to be available for client emergencies 24/7 and therefore I sometimes miss proper relaxation.
	i39	I need to eat my lunch somewhere but there is no proper dining area ("I eat at my desk.")

	i40	I need to work a lot with computers but it is detrimental to my vision and concentration.
	i41	In order to stay fit I need to be more active but I'm not aware of suitable exercises and miss prompts.
	i42	I need to react to customer requests immediately but their accumulation frequently causes great stress.
	i43	At the moment I do not perform any physical or mental exercises at work. However, I think it would be good for me to do this.
	i44	I want take a short walk every half-hour to prevent myself from back pain.
	i45	All week evenings I work at home at the dining table on my laptop. This posture gives me back pain.
	i46	I need an outdoor environment in which I can take a (lunch) walk and relax. Because I spend most of the work day inside. I also feel this need, because of the back pain I experience.
	i47	I want to use the calendar on my smartphone but the text is too small.
	i48	I have (congenital) visual problems for which I wear special contact lenses. This results in a clear vision at about 15 cm from my eyes, which is less than for normal people (about 20-30cm). Therefore I usually sit very close to the screen, paper or whatever I want to see clearly.
	i49	Creative tasks like developing something new or analysis of the data give me energy. E.g. creating a recommender system for exercises.
	i50	Data analysis in Vicon is less appealing to me, as it tends to be a bit boring and not so challenging.
	i51	I take fewer breaks since I smoke e-cigarettes at my desk.
	i52	I do not like to take notes, because elaborating those takes a lot of time. After a long meeting I am already tired and especially then I need my concentration to formulate a coherent story which is even more exhausting.
	i53	I sometimes suffer from back pain.
	i54	Because of vision problems I often lean closer to the screen.
Work Conditions	i55	I want to be flexible in the choice of my work environment but accordant company policies are required for that.
	i56	I need to write in proper Romanian but the default English keyboards come without diacritics.
	i57	I would like to reduce working hours but I have too many tasks/responsibilities.
	i58	I like that open space offices foster social interaction but some of-

		<p>office plans don't account for it</p> <p>i59 I would like to have a direct line from my computer (chat / call / video) with the IT department to be helped by a person who can see what the real problem I face on my computer.</p> <p>i60 I don't want to work at home but sometimes I have to.</p> <p>i61 I value a pleasant appearance of the work environment, e.g. with some art on the walls and plants.</p> <p>i62 I find it important to have nice work-environment (e.g. plants and personal belongings), because a large proportion of human-life is at work.</p> <p>i63 I have various workspaces in which I do not always feel at home. I think I can benefit from RFID-solutions to personalize my work environments.</p> <p>i64 RRD has two flexible workspaces, which are often used by part-time employees and students. These flex-workers can benefit from RFID-personalization. They can feel more comfortable at their workplace with this personalization vs. placing personal tangibles.</p> <p>i65 I have different workplaces: the office, home and sometimes the library. I like to change my workplace when I need a concentration boost.</p> <p>i66 It was hard for me to get used to the fact that I needed to share a room with a colleague, while I had an office for myself in my previous job.</p> <p>i67 I like to work with some music on, regardless of my workplace (at work or at home).</p> <p>i68 Default sound levels are not appropriate. Therefore, I would like to be able to manually adjust the sound levels according to the environment and importance.</p> <p>i69 I want to personalize my workplace (e.g., desktop background), but the company has to allow it.</p> <p>Personal Development i70 I would like to train general skills but the company does not foster it.</p> <p>i71 I would like to learn on my own but there is no dedicated eLearning content (e.g., video tutorials, interactive materials).</p> <p>i72 I would like to receive education on company knowledge/tools, on relevant state of the art, and some background knowledge (e.g., economic principles, coding) but the company does not provide for it.</p> <p>i73 I need to exchange knowledge and experiences with colleagues differing in age but intergenerational teams are not actively supported in their collaboration.</p>
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Tools	i74	I find it important to stay up to date regarding the developments in ICT for education.
	i75	Since several years we are using the Outlook calendar at the office, but I don't know how to use this feature and I do not know how to invite colleagues by using this feature.
	i76	I don't know how to create a new folder; and therefore, all Word and Excel documents, that I often use, are on my "Desktop".
	i77	Actually, I do not know how to zoom in the "office" programs or on the Internet.
	i78	I have a lack of confidence in my own computer skills.
	i79	I want to learn about new software, but my company does not allocate time for it / offer courses.
	i80	I need to compile lists and make calculations but do it by hand because I lack the necessary computer skills (Excel).
	i81	I plan my day on paper because I don't see the benefit of digital solutions.
	i82	I need to track the status of projects and manage contacts in one database, but the current solution (Excel) is not dedicated for that purpose (e.g., it does not allow for simultaneous editing).
	i83	I need to flexibly configure offers based on client requests but I'm not aware of dedicated tools.
	i84	It would be nice if there was an easier way to compare my own private agenda with my work agenda, this would make it easier to plan appointments.
	i85	I prefer to manage my notes and to-do's digitally, because I have various workplaces. Otherwise I have to carry it all with me on paper and then probably things will get lost.
	i86	When working from home I only use my laptop. Sometimes it is difficult to work on my laptop, because I do not have all the software installed that I need (e.g. SPSS). In addition, my computer does not have enough computation power to perform certain demanding tasks (e.g. Matlab and java programming at the same time).
	i87	On my Windows PC, of course I can use larger font sizes, however the icons are still small. I therefore developed my own 'zoom-button' toggle between magnifying all at once, and the normal displayed size.
	i88	Every day I receive between 20 and 30 mails, but I cannot respond to all. I have to make a choice and time is limited. Perhaps a trusted program that allows me to dictate some mails, and it would help me to handle more emails per day.
		When I do analysis on paper then I have to digitize my work. It

i89	makes me lose time for sure.
i90	It would be useful to have a good Calendar, which reminds me of the agenda / my appointments. A simple Calendar version is already on my PC, but I would need the “right one” (for my needs).
i91	I want an always visible external memory resource for frequently needed information (e.g., for technical designs, important deadlines), but my current solution (post-its) is not reliable and cannot hold a lot of information.
i92	I want to work on my tasks in different contexts / environments but there is no seamless way of doing so.
i93	The Cloud is an energy saver. I can easily find my own work and share this information with others.
i94	When I prepare a PowerPoint presentation, I print it and I always consult with the printed version.
i95	I should go with my laptop to the IT department and ask for help, but I'm afraid that I do not understand what to do and that I have to ask again.
i96	I have a Notebook on which I read documents and can easily add written comments to these documents (touch screen and Papyrus). It also has a zoom-function to enlarge the text of the document, which I really like.

2.2.3.2 Insights from the Experience Sampling Method (ESM)

In addition to the insights that resulted from the analysis of the contextual interviews and observations, the Experience Sampling (ESM) data gathered from the Dutch sample allowed for deriving insights with regard to the experiences and emotions in the real work context.

The six participants reported a total of 380 activities during the 29 monitoring days, as shown in Figure 7. The three most reported work activities were: 1) Face-to-Face meetings ($n = 78$, 21%), 2) Writing reports ($n = 38$, 10%), and 3) Answering email ($n = 27$, 7%). These three types of activities amounted to a total of 38% of all reported work activities. The category ‘work other’ was chosen 30 times (8%), which makes it a significant category to study, however it contains a very broad scope of self-defined work activities, therefore making it more difficult to draw general conclusions. For the PEARL system these results imply the need for a strong focus on activities related to face-to-face contact, writing reports and answering email, if it wants to target a large proportion of the daily tasks.

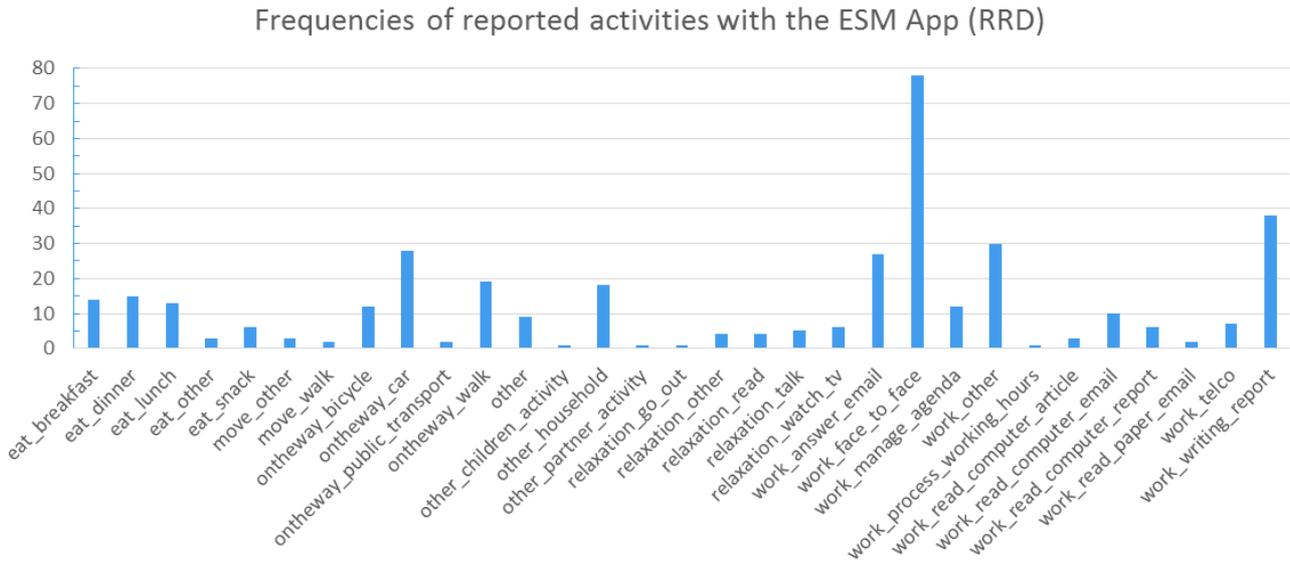


Figure 7 – Frequencies of reported activities in the ESM App. Frequencies are the total of the 6 subjects with a total of 29 days.

In addition to the activities reported during the day, each subject was asked to rate their overall work satisfaction at the end of the workday. The last column in Table 6 shows the development of satisfaction over the course of the participants’ workweek. For some participants (e.g., Subject 2, Subject 5) it shows an increase in work satisfaction over the course of the week; for other participants (e.g., Subject 1, Subject 3, Subject 4, and Subject 6) no such trend was observed.

Table 6 – Workday satisfaction per participant, given for each day of the week.

Subject	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Week profile
Subject1	7,9	8,5	8,1	9,6	8,1		■ ■ ■ ■ ■ ■ ■ ■
Subject2		2,6	5,1	5,6	6,6		■ ■ ■ ■ ■ ■ ■ ■
Subject3	8,7	8,3		7,0	8,0	9,0	■ ■ ■ ■ ■ ■ ■ ■
Subject4	5,3	6,2	4,7	5,2	6,1		■ ■ ■ ■ ■ ■ ■ ■
Subject5	6,2	6,7	7,2	8,3	8,4		■ ■ ■ ■ ■ ■ ■ ■
Subject6	7,4	6,8	8,8	6,7	8,3		■ ■ ■ ■ ■ ■ ■ ■

Based on the 24 monitoring days in total, we created a regression model that explained 62% of the variation in satisfaction. The average level of fun over the day positively contributed to satisfaction, and the fluctuation of feeling over the day, expressed in standard deviation of feeling, negatively contributed to satisfaction.

The tool RRD developed is able to assess physical activity and simultaneously subjective experiences. This allowed us to investigate associations between work experience and physical activity patterns.

2.3 Summary and Implications for the PEARL Platform

In order to elicit requirements from end users, we recruited 19 older knowledge workers in Romania, The Netherlands, and Switzerland for our research. The main goal of our research was to gain bottom-up insights into the work realities and contexts of our target group that can be used as input for generating innovative feature ideas for the PEARL

platform in the next phase of the project. As such the research was interested in getting an overview on typical processes and tools used by our target group, in identifying needs and frictions existing at the workplace, and in deriving insights based on an analysis of these needs, frictions and energizing activities.

In investigating the envisioned end users of the PEARL platform, we follow a multi-method approach that covers the whole spectrum from initial insights to feature ideas, prioritization of feature ideas, and first feedback from users on mock-ups and low-fidelity prototypes based on these feature ideas (see Figure 1 Overview of the phases in the multi-method approach. Black circles represent the phases covered in this deliverable, grey circles represents future work. Only the first two phases — consisting of the Contextual Interviews and Observations, Experience Sampling, and the Needs-Frictions Analysis — are reported in this deliverable.)

The needs, frictions and energizing activities analysis of the contextual interview and observation data yielded a total of 96 insights. Most insights were obtained for the themes task management and mind & body (21 each), followed by tools (18), work conditions (15), personal development (10), communication (7), and collaboration (5).

As mentioned before, the insights vary in the type of solutions they suggest. Some allow for very creative solutions, while others suggest more straight-forward solutions. For example, the insight 'I need to write proper Romanian but the default English keyboards come without diacritics' does not require any new development but can be addressed simply by buying Romanian keyboards. Moreover, some insights are obviously related and thus suggesting similar solutions. For example, the insights 'I need to share information digitally but there is no efficient way of digitizing hand-written information' and 'When I do analysis on paper then I have to digitize my work. It makes me lose time for sure' could be addressed by the same solution.

Nevertheless, each of these insights will be used as input for the next phase in the project, the ideation workshop (see D2.2), thus ensuring that all the available information is considered when deriving innovative feature ideas for the PEARL platform and that solutions developed from the feature ideas are likely to be accepted and appreciated by the users.

3 Requirements of other stakeholders

As the PEARL systems and applications encompass collaborative working processes as well as support for task and work flow management, the inclusion of other target groups such as older employees' co-workers or supervisors in the requirements elicitation was considered to be important. Although PEARL's primary target group will be older employees, their colleagues and other people in the company will both be involved in its application and affected by changes introduced through it. Also, members of these groups were considered to hold important knowledge about business processes, people's habits and other factors that are likely to have an impact on how PEARL can be applied within a given company.

The PEARL work plan caters for this general necessity in terms of a dedicated strand of work focusing on requirements analysis of these so-called *other stakeholders*. This strand of work feeds into subsequent work tasks and work packages, such as use case development, technology service specification, architecture development and testing.

3.1 Target groups and research questions addressed

Based on the initial vision of the PEARL systems and applications it was decided that colleagues and supervisors of the older employees (as primary target group) will be affected by changes introduced through PEARL, as well as key decision makers including line managers and CEOs. Decision makers were specifically included in order to gain requirements ensuring a) a smooth integration of the PEARL services into overall work processes and b) alignment with key strategic company / department objectives.

More precisely, the following target groups were included in the requirements elicitation:

- **Human-Resource-Managers:** This is normally an individual within an organization responsible for hiring new employees, supervising employee evaluations, mediation between employees and bosses as necessary, and general overseeing of the personnel department.
- **Colleagues / co-workers**
- **Supervisors / line managers:** Normally a manager/team leader who leads a revenue-generating department.
- **Key decision makers / CEO** responsible for a firm's overall operations and performance.
- **IT decision makers / CIO** whose primary responsibility is to manage and address technical issues that a company faces.

Stakeholder mapping

Same as for the requirements elicitation from older employees, participants from the *other stakeholders* group were to be selected from the three test site companies participating in the PEARL project (SingularLogic, RRD and COMARG). Since it could not be expected that there would be an individual representative of each target group in every company, a stakeholder mapping procedure was introduced into the first stage of the requirements elicitation process. The procedure allowed researchers responsible for the elicitation to select either direct representatives of a target group or alternatively that person in the company that came closest to filling the envisaged role and would therefore be most likely to accurately report on requirements.

To this end, a stakeholder mapping table was produced for the researchers, shown in Table 7 below. The table lists all five target groups as well as the topics to be addressed with each group (for which see below). For each stakeholder and topic, the table then lists a number of alternative interviewees to be chosen if the original role is not filled by any given person. The researcher was then asked to confirm whether an interviewee for the stakeholder/topic combination existed and who, in case it did not, would be asked as a replacement.

Table 7 – Stakeholder mapping table

Stakeholder	Topic	Alternative interviewees	Your situation
Human Resource Managers	Training / continuous vocational education	Supervisors or other managerial staff Person with dedicated training responsibility Staff members if no formal responsibility assigned	Is interviewee involved in / responsible for the topic: <i>yes / no</i> If no, name replacement interviewee: xxx
	Hiring staff	Supervisors or other managerial staff Person with dedicated hiring responsibility	Is interviewee involved in / responsible for the topic: <i>yes / no</i> If no, name replacement interviewee: xxx
	Health and safety	Supervisors or other managerial staff Person with dedicated health and safety responsibility Staff members if no formal responsibility assigned	Is interviewee involved in / responsible for the topic: <i>yes / no</i> If no, name replacement interviewee: xxx
Supervisors / line managers	Team / group organisation and work processes	Other managerial staff Staff members if no formal responsibility assigned or lean management structures	Is interviewee involved in / responsible for the topic: <i>yes / no</i> If no, name replacement interviewee: xxx
	Skills & training	Other managerial staff Person with dedicated training responsibility Staff members if no formal responsibility assigned or lean management structures	Is interviewee involved in / responsible for the topic: <i>yes / no</i> If no, name replacement interviewee: xxx
	Entitlement of older employees	Other managerial staff Staff members if no formal responsibility assigned	Is interviewee involved in / responsible for the topic: <i>yes / no</i> If no, name replacement interviewee: xxx
	Customer relations & company image	Other managerial staff Marketing / communication staff	Is interviewee involved in / responsible for the topic: <i>yes / no</i> If no, name replacement interviewee: xxx
Key decision makers / CEO	Team / group organisation and work processes	Other managerial staff Staff members if no formal responsibility assigned or lean management structures	Is interviewee involved in / responsible for the topic: <i>yes / no</i> If no, name replacement interviewee: xxx
	Entitlement of older employees	Other managerial staff Staff members if no formal responsibility assigned	Is interviewee involved in / responsible for the topic: <i>yes / no</i> If no, name replacement inter-

	Contractual issues	Other managerial staff	viewee: xxx Is interviewee involved in / responsible for the topic: <i>yes / no</i> If no, name replacement interviewee: xxx
	Customer relations & company image	Other managerial staff Marketing / communication staff	Is interviewee involved in / responsible for the topic: <i>yes / no</i> If no, name replacement interviewee: xxx
IT decisions makers / CIO	Team / group organisation and work processes	Other managerial staff Staff members if no formal responsibility assigned or lean management structures	Is interviewee involved in / responsible for the topic: <i>yes / no</i> If no, name replacement interviewee: xxx
	IT systems in the company	Other managerial staff Person with dedicated IT responsibility Staff members if no formal responsibility assigned	Is interviewee involved in / responsible for the topic: <i>yes / no</i> If no, name replacement interviewee: xxx
	Usability & workplace ergonomics	Other managerial staff Person with dedicated IT responsibility Staff members if no formal responsibility assigned	Is interviewee involved in / responsible for the topic: <i>yes / no</i> If no, name replacement interviewee: xxx
	IT skills & training	Other managerial staff Person with dedicated training responsibility Staff members if no formal responsibility assigned or lean management structures	Is interviewee involved in / responsible for the topic: <i>yes / no</i> If no, name replacement interviewee: xxx
Colleagues / co-workers	Team / group organisation and work processes	Managerial staff	Is interviewee involved in / responsible for the topic: <i>yes / no</i> If no, name replacement interviewee: xxx

To deal with situations (expected primarily for small teams / companies) where roles are not formally assigned (e.g. in terms of a job title) and/or where one person fills more than one role, researchers were instructed that any interviewee does not necessarily have to have the formal or even sole responsibility for the topic in question, but should be involved in it in some way; i.e. should be knowledgeable about the topic.

Topics and research questions

The content areas to be covered in the requirements elicitation form other stakeholders were defined on two levels:

- First, on the level of topics and sub-topics, detailing on a general level what issues to address, and
- Second, on the level of research questions, directly applicable in the interview or focus group context.

Both levels were discussed internal to the project consortium to ensure that all relevant content areas were addressed. All in all, four topics with two to five sub-topics were defined as follows:

- **Business organisation**
 - Management and communication
 - Business processes
 - IT system governance
- **Individual / team work organisation**
 - Communication
 - Workflow processes
 - Usability
 - Ergonomics
- **Skills / training**
 - Training for oneself
 - Training others
- **Business regulation/finance**
 - Entitlement / selection
 - Legal / contractual issues
 - Customer relations / company image
 - Occupational health & safety
 - Financial issues

In the requirements elicitation, topics were addressed depending on target group, based on the assumption that not all groups would be qualified to address all topics, as well as in order to reduce respondent and interviewer burden. The allocation of topics to target groups is shown in Table 8 below.

Table 8 Allocation of topics to target groups

	Human-Resource-Managers	Key decision makers / CEO	IT decision makers / CIO	Supervisors / line managers	Colleagues/ co-workers
Business organisation		√	√		
Individual / team work organisation			√	√	√
Skills / training	√		√	√	√
Business regulation / finance	√	√		√	

For each stakeholder/topic combination, a more detailed list of research questions was then defined as follows:

- **HR-Managers**
 - Introduction / general issues
 - Respondents' main points of contact with older employees in the company (e.g. no regular contacts, through regular meetings or assessment sessions, dedicated reporting structure for issues or concerns, document exchange etc.)
 - Skills & training
 - Main areas where respondent sees problems relating to training / continuous vocational education of older people in the company (either voiced by older employees themselves or by others in the company)

- Main areas where respondent sees problems relating to hiring older people in the company (either voiced by older employees themselves or by others in the company)
- Description of each problem area named
- Prompt for any ideas for solutions
- Business regulation & finance
 - Main areas where respondent sees problems relating to health and safety of older people in the company (either voiced by older employees themselves or by others in the company)
 - Description of each problem area named
 - Prompt for any ideas for solutions
- **Key decision makers / CEO**
 - Introduction / general issues
 - Respondents' main points of contact with older employees in the company (e.g. no regular contacts, through regular meetings or assessment sessions, dedicated reporting structure for issues or concerns, document exchange etc.)
 - Business organisation
 - Main areas where respondent sees problems or a need for action relating to management and communication and the work of older people in the company (either voiced by older employees themselves or by others in the company)
 - Main areas where respondent sees problems or a need for action relating to business processes and the work of older people in the company (either voiced by older employees themselves or by others in the company)
 - Description of each problem area named
 - Prompt for any ideas for solutions
 - Business regulation & finance
 - Main areas where respondent sees problems or a need for action relating to entitlement / selection of older people in the company (either voiced by older employees themselves or by others in the company), e.g. in relation to promotions or wage raises.
 - Main areas where respondent sees problems or a need for action relating to contractual issues and older people in the company (either voiced by older employees themselves or by others in the company), e.g. in relation to work contracts, labour agreements or specific agreements to support older employees.
 - Main areas where respondent sees problems or a need for action relating to customer relations / company image and older people in the company (either voiced by older employees themselves or by others in the company), e.g. customers requesting dedicated inclusion of older employees or voicing concerns about older employees' performance.
 - Main areas where respondent sees problems or a need for action relating to financial issues and older people in the company (either voiced by older employees themselves or by others in the company), e.g. higher labour costs of elder employees, pension funds etc.

- Description of each problem area named
- Prompt for any ideas for solutions
- **IT decision makers / CIOs**
 - Introduction / general issues
 - Respondents' main points of contact with older employees in the company (e.g. no regular contacts, through regular meetings or assessment sessions, dedicated reporting structure for issues or concerns, document exchange etc.)
 - Business organisation
 - Main areas where respondent sees problems or a need for action relating to business processes, IT and the work of older people in the company (either voiced by older employees themselves or by others in the company), e.g. business processes that should be digitalized to better support older employees
 - Main areas where respondent sees problems relating to the adaptation (of IT components) of individual workplaces of older people in the company, e.g. installation of individual soft- or hardware.
 - Description of each problem area named
 - Prompt for any ideas for solutions
 - Individual / team work organisation
 - Main areas where respondent sees problems or a need for action relating to usability of IT for older people in the company (either voiced by older employees themselves or by others in the company), e.g. known applications or devices causing problems for some or all older employees.
 - Main areas where respondent sees problems or a need for action relating to workplace ergonomics (esp. related to IT) for older people in the company (either voiced by older employees themselves or by others in the company), e.g. light adaptation for screen work, adaptation of screen position etc..
 - Description of each problem area named
 - Prompt for any ideas for solutions
 - Skills & training
 - Main areas where respondent sees problems or a need for action relating to IT skills of older people in the company (either voiced by older employees themselves or by others in the company), e.g. known gaps in skills profiles, specific shortcomings.
 - Description of each problem area named
 - Prompt for any ideas for solutions
 -
- **Supervisors / line managers**
 - Introduction / general issues
 - Respondents' main points of contact with older employees in the company (e.g. no regular contacts, through regular meetings or assessment sessions, dedicated reporting structure for issues or concerns, document exchange etc.)
 - Individual / team work organisation
 - Main areas where respondent sees problems or a need for action relating to management and communication and the work of older

- people in the team (either voiced by older employees themselves or by others in the team).
- Main areas where respondent sees problems or a need for action relating to business processes and the work of older people in the team (either voiced by older employees themselves or by others in the team).
- Main areas where respondent sees problems or a need for action relating to usability of IT for older people in the team (either voiced by older employees themselves or by others in the team), e.g. known applications or devices causing problems for some or all older employees.
- Main areas where respondent sees problems or a need for action relating to workplace ergonomics for older people in the team (either voiced by older employees themselves or by others in the team), e.g. light adaptation for screen work, adaptation of screen position etc..
- Description of each problem area named
- Prompt for any ideas for solutions
- Skills & training
 - Main areas where respondent sees problems or a need for action relating to work-related skills of older people in the team (either voiced by older employees themselves or by others in the team), e.g. known gaps in skills profiles, specific shortcomings.
 - Description of each problem area named
 - Prompt for any ideas for solutions
- Business regulation & finance
 - Main areas where respondent sees problems or a need for action relating to entitlement / selection of older people in the team (either voiced by older employees themselves or by others in the team), e.g. in relation to promotions or wage raises.
 - Main areas where respondent sees problems or a need for action relating to customer relations / company image and older people in the team (either voiced by older employees themselves or by others in the team), e.g. customers requesting dedicated inclusion of older employees or voicing concerns about older employees' performance.
 - Description of each problem area named
 - Prompt for any ideas for solutions
- **Colleagues of the older employee(s)**
 - Individual / team work organisation
 - Are there any particular challenges and problems arising for you personally when working together with older colleagues in a team?
 - Are there any problems you think (some of) your older colleagues have with their individual work processes/tasks as well with working as part of a team?
 - Imagine that your company would implement support services/applications addressing the challenges you mentioned before (examples here: specific IT training, software adaptation):

- Do you think that this would cause problems for your 1) individual work processes, 2) team processes, 3)...
- Why?
- What do you think would need to be done in order to address the problems you mentioned before?

3.2 Methods & procedures

Methods were chosen on the one hand, to ensure a thoroughly conducted, process-oriented requirements elicitation, facilitating the collection and categorization of requirements and allowing for an easy transition into the development process. On the other hand, choice of method had to consider both the varying points of departure across the individual pilot companies (which was done by applying the stakeholder mapping process described above) and the capabilities and capacities of the staff conducting the research onsite.

To this end, semi-structured single interviews were chosen as the primary method because of their capacity to allow the participant to reveal what is important to them and to share their world with the researcher, while at the same time giving the interviewer a clear schedule of topics to introduce into the interview to stimulate discussion. Semi-structured interviews were conducted with four of the five target groups:

- Human-Resource-Managers
- Supervisors/line managers
- Key decision makers/CEO
- IT decision makers / CIO

Co-workers were addressed by means of a focus group primarily because the more interactive nature of a group discussion was considered to better stimulate requirements elicitation for this group. They allow people to build upon other people's responses, to balance extreme views through interventions from other participants, and to make important points clearer for the observer when a majority of participants underline the same aspects.

Guidelines & planning

Researchers in the pilot companies were provided with an overall guideline document describing the rationale of the approach and the methods to be applied. They received a separate document containing the stakeholder mapping table (see above) to facilitate the selection of respondents. For each stakeholder group to be addressed, an interview / focus group schedule was produced containing practical guidance, a table to collect general information about the event (date, time, job title of interviewee, topics covered and name of interviewer) and a data collection template made of the research questions to be addressed (see above). The interview schedule for Human Resource Managers (HRM) is included in the Appendix A.2 of this document as an example.

Furthermore, researchers received a model informed consent form to be used if no other form was required based on national or other regulation.

3.3 Reports from the pilot companies

This section contains the field reports from the requirements analysis carried out in each of the three pilot companies. Conclusions and implications for the PEARL development process are presented in the next section.

3.3.1 COMARG

A total of five interviews with relevant personnel were carried out as follows:

Table 9 Interviews with other stakeholders at COMARG

Interviewee reference	COMARG 1	COMARG 2	COMARG 3	COMARG 4	COMARG 5
Date of the interview	21 Jan 2015	28 Jan 2015	2 Feb 2015	6 Feb 2015	9 Feb 2015
Time of the interview	13:00h – 14:00h	10:00h – 11:30h	16:30h – 17:30	15:30h – 17:20h	14:00h – 15:30h
Job title of interviewee	CEO	Deputy Director	CEO	IT Manager	Director of Human Resources
Name of interviewer	Tunde Kallai	Roland Grunder	Dario Adjaho	Roland Grunder	Roland Grunder

In addition to this, one focus group with co-workers was carried out as follows:

Table 10 Co-worker focus group at COMARG

Workshop focus group	COMARG 6
Date of the focus group	Friday, 2015, March 7th
Time of the focus group	14:30h – 17:00h
Participants	3
Name of moderator	Roland Grunder
Name of researcher documenting discussions:	Dario Adjaho (repl. by Lionel Bileci) ²

3.3.1.1 Interviewee COMARG 1

The interviewee holds the position of CEO in the company. He describes himself as the main decision maker for the entire company.

As CEO he reports to have daily phone and/or personal or email contacts with the company's older employees. There are regular staff meetings every week on Thursday in the company.

Team / group organisation and work processes

The interviewee sees no problems or a need for action relating to management and communication and the work processes of older people in the company.

Business processes

The interviewee refers specifically to the role of skills and training, and especially of e-learning, as this is the main service offered by the company. He stresses the good experi-

² Due to unforeseen circumstances, Dario Adjaho had to be replaced by Lionel Bileci.

ences made by combining e-learning with a mentoring approach, accompanying the trainees.

Entitlement / selection of older people

The interviewee reports that publications and other references are a main source for establishing the competencies of an employee, including older employees. Employees not showing relevant references in their fields of expertise are requested to take part in self-learning courses.

Contractual issues

The interviewee sees no problems or a need for action relating to contractual issues and older people in the company.

Customer relations & company image

The interviewee reports that far from being a problem, the pedagogical experience of older employees is usually valued by the customers.

Financial issues

The interviewee sees no problems or a need for action relating to financial issues and older people in the company.

3.3.1.2 Interviewee COMARG 2

The interviewee is the Deputy Director of the company. He is responsible for the logistical and human resources organisation, as well as for all project research and EU project management. He reports to be in daily contact with all his employees but not specifically with the older ones.

Team / group organisation and work processes

The interviewee names “one [...] small problem” only in relation to work organisation, namely that older employees have a higher allowance of vacation days compared to younger colleagues. This can lead to an increased workload among younger staff.

Business processes

The main problem in this area, as seen by the interviewee, is replacing older employees when they retire and in the process losing their expertise. He states that one option could be to keep them working as consultant in the company, helping young employees in the operational issues.

Entitlement / selection of older people

The interviewee sees no problems or a need for action relating to entitlement / selection of older people in the company.

Contractual issues

The interviewee describes the employer’s contribution to the retirement insurance as a major barrier to the hiring of older employees, but sees no solution to the situation other than to factor this into financial planning.

Customer relations & company image

The interviewee reports that far from being a problem, the experience and competences of older employees is usually valued by the customers.

Financial issues

See under *Contractual issues*.

3.3.1.3 Interviewee COMARG 3

The interviewee holds the position of CEO in the company. He describes himself as being responsible for human resources, finance & accounting, marketing, workflow and business process management, only delegating customer relationships to his employees.

He reports to have regular meeting with staff, including older employees.

Team / group organisation and work processes

The interviewee states that older employees tend to hide their shortcomings, generally lack interest in IT and new technologies, and have difficulties in changing their work routine. Specifically he reports difficulties with Excel, tablet computers and social media (for instance LinkedIn). He thinks that on the one hand this requires better management, verification and motivation/incentives. With a view to IT-supported solutions he sees a potential in using simple and efficient tutorials.

Business processes

The interviewee reports that senior employees are less stress resistant.

Entitlement / selection of older people

The interviewee reports that in the past he had cases where he fired older employees briefly after hiring them, because they had overstated their competences in the job interview. He states that a senior profile is interesting in sale but not in administration.

Contractual issues

The interviewee also refers to the retirement insurance issue (see above), but this the additional costs as being compensated by the higher experience.

Customer relations & company image

The interviewee reports that older employees tend to be valued by customers due to being closer to the customer and an ability to avoid risks. He also states that senior employees show a lack of foreign language skills.

Financial issues

The interviewee sees no problems or a need for action relating to financial issues and older people in the company.

3.3.1.4 Interviewee COMARG 4

The interviewee is IT Manager at the company. He reports being responsible for maintaining information technology strategies by managing staff; and researching and implementing technological strategic solutions for the company. He is the assistant of the HR Manager for the selection of new employees and for designing new job profiles.

He reports that there are regular IT team meetings, as well as staff meetings, not specifically with older employees. Sometimes there are specific meetings with older employees because of their high competences and experience. They talk some time about other problems specific to their seniority position.

IT & business processes

The interviewee states that most of the older employees in the company do not like changes to the IT they are using. Any change requires them to adapt their job profile and to learn the new system. He sees a need for continuous discussion with all staff about this topic and possibly also for extending the time given to older employees for adaptation.

Adaptation of IT components at the workplace

The interviewee repeats the problem stated above in relation to the introduction of new IT. He mentions team trainings or e-learning solutions as a means for mutual learning between older and younger employees.

Usability of IT

The interviewee refers again to adaptation time needed by older staff and the use of e-learning.

Workplace ergonomics

The interviewee reports that workplace ergonomics are usually dealt with by the health and safety team. He states that ergonomic adaptations are sometimes needed, often in relation to seating. He says that problems in relation to this would need to be referred to the respective team.

IT skills

The interviewee states that the IT skills of older employees are mostly above the average skills level of all other staff. The main need for training arises from people newly come to the company.

3.3.1.5 Interviewee COMARG 5

The interviewee is Human Resources Manager at the company. He is responsible for all HR management.

The interviewee reports that he has more contacts with older employees than with others, due to their experience levels.

Skills & training of older employees

The interviewee states that there is no general continuous training for older employees. Trainings are developed with the introduction of new technologies or methods and then applied.

Hiring of older employees

The interviewee makes reference to the insurance premium problem, without seeing an immediate solution to the problem.

Health and safety issues in the company

The interviewee states that he does not see more health problems among older employees compared to younger ones. He furthermore states that in case of health problems,

older people will resist longer before staying at home. He sees a potential benefit in repeatedly raising issues such as behaviour in case of illness or safety problems during meetings or to make them part of training programmes.

3.3.1.6 Focus group COMARG 6

The focus group was attended by 3 staff members, of which 1 was a Chief Editor, 1 a General Manager and Human Resource Manager, and 1 the IT Director and responsible Desktop Publisher.

The participants reported that the work is a combination of group activities (such as editorial conferences) and individual work.

Experiences in working as a team

Participants talked about the role of group or team work which is crucial, especially in relation to editorial work. The personalities of each journalist were said to be a key factor when it comes to work being problematic or successful. Divergences in technical skills and knowledge were mentioned as sometimes causing problems.

As far as older employees are concerned, participants by and large saw no difficulties but rather advantages from mixed teams. The Chief Editor stated that younger colleagues often enjoy working with older journalists. Some problems were mentioned in relation to IT skills by the IT director. Lower skills levels among older employees sometimes cause problems, when new software is introduced or existing software receives major updates.

Experiences with individual work processes of your older colleagues

The Chief Editor reports that some topic areas are more difficult for older journalists to cover, such as nightlife reports, more difficult geographical topics, or climate change. At the same time, other topics, such as politics or classical culture (concerts, theatre) are more in line with the interest of older journalists. Similarly, they display greater faculty in business and finance issues. Both the Chief Editor and the HR Manager mention that team diversity plays an important role. The IT director mentions that IT skills of older employees are addressed through internal training courses.

Advantages & disadvantages of new ICT

In relation to editorial staff, the general switch to IT systems was reported as having caused no major problems, although individual working practices may still rely on “traditional methods”. The HR manager reported that the introduction of IT into management processes may have led to some cases of older employees choosing early retirement. Similar effects occurred in the editorial team. The introduction of Desktop Publishing (DTP) required great efforts from some staff members, especially among older staff members.

Apart from training, the implementation of new processes, attuned to IT use, was the main measure undertaken, sometimes with the help of external coaches.

3.3.2 Roessingh Research and Development (RRD)

A total of four interviews with relevant personnel was carried out as follows:

Table 11 Interviews with other stakeholders at RRD

Interviewee reference	RRD 1	RRD 2	RRD 3	RRD 4
Date of the interview	6 Jan 2015	7 Jan 2015	16 Jan 2015	30 Jan 2015
Time of the interview	13:30h – 14:30h	14:00h – 15:00h	9:00h – 10:00h	13:30h – 14:30h
Job title of interviewee	Human Resource Advisor	Training Advisor	Prevention Advisor	Reintegration Specialist, CEO
Name of interviewer	Simone Boerema	Simone Boerema	Simone Boerema	Simone Boerema

In addition to this, one focus group with co-workers was carried out as follows:

Table 12 Co-worker focus group at RRD

Workshop focus group	RRD 5 (workshop)
Date of the focus group	6th of January 2015
Time of the focus group	12:30 (starting time)
Participants	Male = 8 Female = 16
Name of moderator	Simone Boerema
Name of researcher documenting discussions:	Mirka Evers

3.3.2.1 Interviewee RRD 1

The interviewee holds the position of Human Resource Advisor in the company. She supports the management and staff in all areas that have to do with the human resources, organizational advice and change. Apart from this she is involved in the development and implementation of new personnel and instruments in the organization.

Skills & training of older employees

The interviewee sees a main challenge in retaining the knowledge of skilled personnel in the organisation. She gives several positive and negative examples, concluding that currently there is no structural support for knowledge management in the organization. Current approaches to solving this issues include, according to the interviewee, the use of a common file storage system (allowing everyone access to all files), as well as the use of commercially available ICT system, opposed to in-house developed solutions.

Hiring of older employees

See *Skills & training of older employees*.

Health and safety issues in the company

See *Skills & training of older employees*.

3.3.2.2 Interviewee RRD 2

The interviewee is Training Advisor in the company. He reports that he is responsible for the management of staff knowledge and experience, for supporting internal knowledge transfer and purchasing education from external parties, and for the valorisation of knowledge, experience and skills to third parties.

The interviewee sees older employees leaving the company as a major challenge, since their knowledge and skills are easily lost. He reports that there is a Learning Management System (LMS) in place, but that this does not fit the needs of the organization. He sees a need for functionalities supporting the transfer of specific knowledge, e.g. by means of short videos.

He also sees a need for better tracking (formal) professional development of staff, as well as a better exchange on existing skills among employees, in a kind of organisation-internal “LinkedIn”.

The interviewee sees another priority area in facilitating knowledge transfer from older employees in the last 5 years of their employment. There should be dedicated time in the work schedule to allow for this. Older employees should be able to determine those areas of expertise at which they are best and be supported in sharing their knowledge in different ways. The interviewee states that this could be facilitated by a digital system.

With regards to the practical implementation of PEARL, the interviewee states that “super users” or experts might be used to help other users to get acquainted with the system.

3.3.2.3 Interviewee RRD 3

The interviewee works as a part-time Prevention Advisor for the company. In this capacity he is responsible for issues of workplace ergonomics.

In relation to workplace ergonomics, the interviewee states that an important aspect in this is self-awareness of e.g. work posture. Changing unhealthy work methods (habits) is often sufficient to relief the complaints. This can be achieved by awareness and feedback, and often without any change to the physical workplace.

He mentions specifically problems occurring in the use of computer keyboards and the mouse, as well in relation of environmental factors such as light levels, humidity, display settings etc., stating that it is not always clear to him what the best settings are.

The interviewee states that the introduction of new IT systems raises specific challenges in relation to ergonomics, but also in relation to age and the pervasiveness of IT skills. He specifically mentions the introduction of tablet PCs that might not be ergonomic for all types of work (such as the typing of long reports). In relation to older employees he states concerns that this might be overburdened by fast-paced changes to IT systems, and especially by the impact this has on the way they work.

Specifically referencing the way of working of care professionals with the usually short time dedicated to any one patient, the interviewee sees a need for IT systems that are quickly available and allow for easy data entry (e.g. through voice recognition).

In relation to flexible workspaces / desk sharing, the interviewee mentions specific ergonomic issues resulting from this, e.g. if a workspace cannot be easily adapted to the requirements of each worker using it.

3.3.2.4 Interviewee RRD 4

The interviewee works as Reintegration Specialist and CEO of the company. He works specifically in the development of solutions for people with physical and/or cognitive disabilities.

In relation to this, he states a number of generic requirements that would need to be met. This includes that solutions need to be robust, especially if used by people with limited fine motoric skills.

Furthermore he states that solutions need to be easy to use. Specifically, solutions regarding communication support need to have a good audio performance and produce clear, audible amplifiable sound (e.g. in a text to speech device).

The interviewee also states that good support to clients is important.

3.3.2.5 Focus group RRD 5

The co-workers focus group consisted of an online questionnaire and a plenary discussion. The online questionnaire was filled in by 24 employees of RRD (8 Male; 16 Female), average age 30,5 years (SD = 7,6) with an average number of contract hours of 33,5h per week (SD = 5,4). The discussion was done with 26 employees who reported on the number of devices they work on during and after office hours. It ranged from 1 to 5 devices, and most common was the usage of three devices (see Table 13). The PEARL platform should stretch to all devices if it wants to be adopted in habitual working rhythms. Device handovers and synchronisation should be supported.

Table 13 Number of devices used by number of employees (n=26)

Number of devices in use	Number of employees using these devices
1	1
2	8
3	12
4	4
5	1

More details and insights from the co-workers focus group can be found in Appendix A.3.

3.3.3 SingularLogic

A total of four interviews with relevant personnel was carried out as follows:

Table 14 Interviews with other stakeholders at SingularLogic

Interviewee reference	SiLo 1	SiLo 2	SiLo 3	SiLo 4
Date of the interview	20 Jan 2015	23 Jan 2015	16 Feb 2015	17 Feb 2015
Time of the interview	13:00h –	13:00h –	13:45h –	10:00h –

	13:25h	14:00h	14:30h	10:45h
Job title of interviewee	CEO	HR Manager	Country Manager	Head of Department
Name of interviewer	Stamatia Rizou	Stamatia Rizou	Stamatia Rizou	Stamatia Rizou

In addition to this, one focus group with co-workers was carried out as follows:

Table 15 Co-worker focus group at SingularLogic

Focus group reference	SiLo 5
Date of the focus group	30 Jan 2015
Time of the focus group	14:00h – 14:50h
Participants	6
Name of moderator	Stamatia Rizou
Name of researcher documenting discussions:	Stamatia Rizou

3.3.3.1 Interviewee SiLo 1

The interviewee is CEO of the company. He states to oversee the main areas of management and strategy of the company. He reports to have regular meetings with high- and middle-level management and does not mention specific meetings with older employees.

Team / group organisation and work processes

The interviewee reports that in relation to management issues one specific issue arising in relation to older employees is the adaptation to new tools being introduced in the company. He states that among this group there is a high amount of resistance to change. The interviewee mentions a number of possible solutions to such problems, including the selection of especially user-friendly applications, dedicated assessment of the needs of older employees, the use of applications with intuitive user interfaces and the provision of special training.

Business processes

Also in relation to business processes, the interviewee mentions resistance to change as a main issue. Furthermore, he states that older employees tend to experience more difficulties when adapting to complicated processes. He makes specific mentioning of situations where process change requires the collaboration with a higher number of people or departments compared to the status quo. He considers the explanation of process changes as a way to resolve such issues, as well as providing dedicated means for the older employees to raise questions. He also sees merit in specifically considering the needs of older people in the process design phase.

Entitlement / selection of older people

The interviewee sees no problems or a need for action relating to entitlement / selection of older people in the company.

Contractual issues

The interviewee reports that the company makes an effort to consider the special needs of older employees when any agreements are being made. In such cases, the HR depart-

ment should be informed about the special needs that arise so that the contract can be amended accordingly or specific contracts can be drawn up.

Customer relations & company image

The interviewee reports that customers of the company tend to expect to be working with younger employees, assumedly because of the IT / new technology context. He considers updating or altering task allocation from and to older employees depending on their performance as a possible solution.

Financial issues

The interviewee states that in financial terms, older employees tend to be more costly for the company due to decreased productivity compared to higher cost. He sees the provision of support to productivity as a potential solution, e.g. helping older employees to organize themselves better, remind them of open task and deadlines and to support communication.

3.3.3.2 Interviewee SiLo 2

The interviewee is Human Resource Manager at the company. He describes his main areas of responsibility as recruitment of new employees, training and development of personnel, health and safety, compensation and benefit policies for employees and the application of Corporate Social Responsibility with respect to human resources.

The interviewee reports to have regular personal (and/or email) contacts with older employees. He states that there are regular meetings or assessment sessions taking place and that there is a dedicated reporting structure for issues or concerns in the company. The latter is available independent of the employees' age.

Skills & training of older employees

The interviewee states that intra-company mobility is a special issue in relation to older people. He reports that they tend to work in the same area of the company for a long time and then have troubles adapting to new contexts if required. The company is planning to introduce job rotation (in a 5-6 years cycle) to address this issue. The interviewee also states that appropriate training means could make a contribution.

Hiring of older employees

The interviewee reports that in staffing junior or medium experience level positions the company receives applications from older people who are then over-qualified. Also the company tends to prefer, for such positions, younger employees over older employees, since they are considered a saver choice.

Health and safety issues in the company

The interviewee sees no problems relating to health and safety of older people in the company.

3.3.3.3 Interviewee SiLo 3

The interviewee works as a country manager for the company. He describes his main areas of responsibility as corporate administration (including project administration), sales planning and management and communication with customers.

The interviewee reports to have regular personal (and/or email) contacts with older employees.

Team / group organisation and work processes

The interviewee sees no problems or a need for action relating to team / group organisation and work processes and the work of older people in the company.

Business processes

The interviewee states that older employees experience difficulties in following business processes of the company more frequently than younger employees. He sees reluctance to change on the part of the older employees as a reason for this. He considers better training in relation to process change as well as better communication among employees (specifically peer training) as a means to improve the situation.

Entitlement / selection of older people

The interviewee sees no problems or a need for action relating to entitlement / selection of older people in the company.

Contractual issues

The interviewee sees no problems or a need for action relating to contractual issues and older people in the company.

Customer relations & company image

The interviewee sees no problems or a need for action relating to customer relations / company image and older people in the company.

Financial issues

The interviewee sees no problems or a need for action relating to financial issues and older people in the company.

3.3.3.4 Interviewee SiLo 4

The interviewee works as Head of Department in the company. He describes his responsibilities as leading a group of 10 people, acting as Contract Manager in all the contracts of the department, acting as Project Manager in some projects of the department, and as leading the sales and presales activities of the department

The interviewee reports that all employees in his department (including himself) cooperate with older employees in more or less the same way as with younger employees, using different communications means (meetings/phone calls/emails). He reports further that the group tends to use less instant messaging communication means as well as smart phone communication features.

Management of the team and communication among team members

The interviewee reports that older employees sometimes exhibit time constraints due to family commitments, leading to a resistance in the adoption of telework models or of *any place – any time* working arrangements. He sees improvements in time management, e.g. through reminders as a possible solution, as well as training in the use of ICT tools such as smartphones.

Usability (issues) of IT for older employees in the team

The interviewee reports that older employees tend to have problems with IT application on small screens (especially on mobile devices) as well as with the use of complex software applications (such as project management systems). He sees training as a potential solu-

tion, as well as the design or adaptation of the user interfaces of such applications, in order to make them more user-friendly.

Development/retaining of work-related skills of older employees in the team

The interviewee repeats the issues encountered in relation to the adoption of flexible working models (see above). He sees specific training on working habits and working models as a possible solution, as well as the introduction of IT tools supporting such working models.

Entitlement / selection of older people

The interviewee sees no problems or a need for action relating to entitlement / selection of older people in the company.

Customer relations & company image

The interviewee sees no problems or a need for action relating to customer relations / company image and older people in the company.

3.3.3.5 Focus group SiLo 5

The focus group was attended by 6 staff members working in a team, of which 1 was a team leader, 2 were senior staff members and 3 junior staff members. Depending on their position, participants described their role as being in project management, implementation or planning.

The participants reported that their main means of communication in day-to-day work are e-mail and (video) conference calls. They also report to hold regular face-to-face meetings.

Experiences in working as a team

Participants talked about a number of means used by them to ensure that team work is effective, including regular meetings with specific agendas and minutes, close monitoring of work processes and the establishment of long-lasting collaborations with partners. In general terms they report problems encountered with unreliable communication channels (e.g. poor audio quality during phone conferences) and the co-ordination of work and the building of a common understanding among partners.

With a view to older employees they state that they might sometimes be unfamiliar with or unwilling to adapt to new technologies. Some tend to stick to traditional working methods, such as taking notes on paper. Some also exhibit a tendency to insist about their own point of view in relation to specific methodologies or solutions and to be unwilling to change their opinion. Participants also stated that sometimes older employees need further clarifications or a repetition of things that were discussed. With a view to IT systems, participants stated that older employees may need larger screen resolutions or bigger font sizes.

Experiences with individual work processes of your older colleagues

The discussion under this point mentioned the same problems as those described above. The participants considered the use of continuous training, certain assistive technologies and simpler user interfaces as potential solutions.

Advantages & disadvantages of new ICT

Participants stated that complex interfaces of applications can cause problems, similar to a lack of training and appropriate guiding material. Problems with IT are further aggravated

by systems that require the user to adapt to the system rather than the other way around, as well as by frequent system updates. With a view to older employees, participants stated that these tend to be affected by these problems to a greater extent than younger ones. Potential solutions were seen the provision of training, peer support among colleagues and the use of a knowledgeable support point, e.g. a technical expert.

Participants mentioned that in general, services should be the same for all team members, regardless of age. Otherwise problems in the team might arise. There should be a possibility to personalize and adapt services to the needs of older employees.

3.4 Summary of main findings

In order to elicit requirements of other stakeholder, a total of 13 interviews and three focus groups were conducted. The requirements analysis showed that there exist a number of issues arising from the employment of older people in the companies involved that fall under the objectives of PEARL. Most frequent mentioning was made of training as a means to facilitate older employees' participation in working live. Different interviewees expressed different ideas of how training could be provided or what it could entail in content terms.

One topic emerging frequently and from a number of interviews relates to changes in business processes and older employees' capacity to adapt to such changes, which was said to be lower than for younger employees by several interviewees. Here, too, training but also improved communication in teams and between management and team were seen as potential solutions. In one case, external coaches were employed.

Two other, related topics that were mentioned frequently are ergonomics and usability. Several interviewees stated that they see a special need among older employees to work with applications with user-friendly and intuitive interfaces. Similarly, workplace ergonomics were mentioned by some to be of special importance for older co-workers.

The requirements analysis also showed that there are a number of issues that fall outside the scope of a system such as PEARL and would require being addressed on a higher level. One example for this is higher wages that are usually paid to older employees and may relate unfavourably to decreased productivity. Interviewees expressed mixed views as to whether older employees are more or less productive than their younger colleagues. Several mentioned that this depends on the type of task the employees are responsible for. In all three companies interviewees stated that some older employees are reluctant to adopt new technology.

With a view to concrete, IT-based solutions to encountered problems which could become part of PEARL, interviewees and focus group participants sometimes mentioned explicitly applications such as training software or task scheduler. In many cases, solutions were named on a functional level or not at all.

A detailed analysis of the implications of the requirements research with other stakeholders on the PEARL system is presented in D2.2 when set in relation with the feature ideas. Relevant insights from the requirements analysis of other stakeholders are mapped against the feature ideas in order to provide either additional insights for development or a further means to prioritize features.

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Appendix A

A.1. RRD – Contextual inquiries

A.1.1. Feature ideas

Table 16 - Summary of all feature ideas by RRD

Theme	Insight	#	Feature idea
Task management; Physical health & ergonomics	I want take a short walk every half-hour to prevent myself from back pain. [PP3_20] I sometimes suffer from back pain. [PP3_26] At the moment I do not perform any physical or mental exercises at work. However, I think it would be good for me to do this.[PP6_20]	1	A system that motivates users to take sufficient short breaks to stay physically active (to prevent back pain).
Physical health & ergonomics	All week evenings I work at home at the dining table on my laptop. This posture gives me back pain.[PP6_19]	2	A tool that prevents long periods of sitting in a bad position (e.g. at a kitchen table with a laptop).
Environment; Task management	I need an outdoor environment in which I can take a (lunch) walk and relax. Because I spend most of the work day inside. I also feel this need, because of the back pain I experience.[PP1_01] An outdoor environment is important to me.[PP2_08]	3	Walking time outdoors in the nature should be part of the day schedule and be encouraged by the system.
Communication	I like to have contact with colleagues, but I am traveling a lot or working on other places. Therefore would it be nice to have some kind of chat program maybe in combination with a video function.[workshop] There needs to be a more informal way to communicate with colleagues, other than by e-mail. [workshop]	4	There is a need for an informal way of communicating with colleagues other than by email, which is also available while traveling and at other workplaces. IRC (Internet Relay Chat) might be a possible solution.
Personal development	I find it important to stay up to date regarding the developments in ICT for education. I like to share new things I find on the internet on our work domain with colleagues, but email is too formal for that. [workshop]	5	A system that provides the newest updates and enables sharing this with colleagues. (e.g. regarding ICT in education).
Tools; Mental health	Creative tasks like developing something new or analysis of the data give me energy. E.g. creating a recommender system for exercises. [workshop] Data analysis in Vicon is less appealing to me, as it tends to be a bit boring and not so challenging. [workshop]	6	A system that supports creativity through mental challenges.
Environment	I value a pleasant appearance of the work environment, e.g. with some art on the walls and plants. [PP1_21] I find it important to have nice work-environment (e.g. plants and personal belongings), because a large proportion of human-life is at work.[PP3_08]	7	A nice and personal work-environment (e.g. plants and personal touches).
Environment	I have various workspaces in which I do not always feel at home. I think I can benefit from RFID-solutions to personalize my work environments.[PP6_26] RRD has two flexible workspaces, which are often	8	A RFID-tool that personalizes a workplace within so to speak, one push on the button.

Theme	Insight	#	Feature idea
	<p>used by part-time employees and students. These flex-workers can benefit from RFID-personalization. They can feel more comfortable at their workplace with this personalization vs. placing personal tangibles. [PP6_27]</p> <p>I have different workplaces: the office, home and sometimes the library. I like to change my workplace when I need a concentration boost. [workshop]</p>		
Environment	<p>I like to work with some music on, regardless of my workplace (at work or at home). [PP1_19]</p> <p>Default sound levels are not appropriate. Therefore, I would like to be able to manually adjust the sound levels according to the environment and importance. [PP1_20]</p>	9	Sound levels and ambiance of the office should be adjusted to different types of tasks (e.g. cognitive tasks and face-to-face meetings).
Task management	<p>I have a lot of distraction in my work (like colleagues asking short questions, and phone calls), which takes a lot of unnecessary time.[PP2_05]</p> <p>It was hard for me to get used to the fact that I needed to share a room with a colleague, while I had an office for myself in my previous job.[PP2_07]</p> <p>I do not like to take notes, because elaborating them takes a lot of time. After a long meeting I am already tired and especially then I need my concentration to formulate a coherent story which is even more exhausting.[PP2_12]</p> <p>Staying focused is harder when there is a lot of distraction from colleagues walking in and phone calls which I have to answer for both me and my colleague with who I share the office.[PP4_04]</p> <p>My family finds it more difficult to keep work and private separate and disturb regularly with brief questions.</p>	10	Creating a quiet and pleasant environment appropriate for cognitive demanding tasks (e.g. a 'do not disturb sign' while working up notes). Possibly, extended with a task management tool that signals others on the type of task that one is working on, so that interruptions can be done at the moment which fits best (e.g. during tasks with low cognitive demands).
Task management	<p>I have a lot of distraction in my work (like colleagues asking short questions, and phone calls), which takes a lot of unnecessary time.[PP2_05]</p> <p>It was hard for me to get used to the fact that I needed to share a room with a colleague, while I had an office for myself in my previous job.[PP2_07]</p> <p>I do not like to take (official) notes of meetings, because elaborating them takes a lot of time. After a long meeting I am already tired and especially then I need my concentration to formulate a coherent story which is even more exhausting. Staying focused is harder when there is a lot of distraction from colleagues walking in and phone calls which I have to answer for both me and my colleague with who I share the office.[PP2_12]</p> <p>I find it difficult to structure time demanding tasks (e.g. repairing technology) vs. ad-hoc questions of customers.[PP4_11]</p>	11	A task management tool that can help with planning the tasks that suits best with the dynamic environment (e.g. attendance of colleague with who the office is shared, or customers walking in the shop with questions vs. time demanding repairs).
Task management	<p>Appointments are scheduled for me, without enough time between them. Too many appointments on a day. I need time between meetings to process information and execute forthcoming</p>	12	Task management support to create enough time between meeting to process information and execute forthcoming tasks (e.g. auto suggest time between two meetings in the agenda).

Theme	Insight	#	Feature idea
	tasks.[PP1_08]		
Task management	<p>I took the initiative to implement the Getting-Things-Done (GTD) methodology in Outlook, as I want to learn how to further structure long and short term tasks. So I can function more efficient.[PP5_03]</p> <p>In the past I sometimes did not met the deadlines as I wanted to deliver 'too good or beautiful' products. I learned from these experiences and try to work on it.[PP5_04]</p> <p>My day plan can be easily changed by unforeseen interruptions, like a phone call resulting in an urgent task or a colleague walking in with a question. I don't mind this, as long as it is within certain time-boundaries.[PP5_24]</p> <p>Every morning I try to set the goals for the day and prioritize them. The day is over when at least the most important goals are achieved. [workshop]</p> <p>Sometimes I set goals and sometimes I reach them. [workshop]</p> <p>I look on my to-do list what needs to be done and then I start the day. Sometimes I have enough time to finish it all and sometimes I do not. [workshop]</p>	13	<p>Support like the Getting-Things-Done (GTD) methodology, integrated in Outlook, to further structure long and short term tasks and to function more efficient. (E.g. to prevent spending too much time on 'too good or beautiful' products, resulting in a missed deadline).</p> <p>Link: http://gettingthingsdone.com/</p>
Task management; Tools	<p>I would be nice if there is an easier way to compare my own private agenda with my work agenda, this makes it easier to plan appointments. [workshop]</p>	14	<p>An intuitive tool that can combine different types of agendas.</p>
Task management; Tools	<p>I prefer to manage my to do lists and documents digitally, so I can easily combine them with my personal notes. [workshop]</p> <p>I keep the long term tasks digitally in a program in which I can easily open and adjust them. [workshop]</p> <p>I prefer to manage my notes and to-do's digitally, because I have various workplaces. Otherwise I have to carry it all with me on paper and then probably things will get lost. [workshop]</p>	15	<p>A program in which different types of notes can easily be stored, combined and adjusted (e.g. Notepad).</p>
Tools	<p>The Cloud is an energy saver. I can easily find my own work and share this information with others. [workshop]</p>	16	<p>The Cloud, can easily be used to access personal documents and share information with others.</p>
Tools; Environment	<p>When working from home I only use my laptop. Sometimes it is difficult to work on my laptop, because I do not have all the software installed that I need (e.g. SPSS). In addition, my computer does not have enough computation power to perform certain demanding tasks (e.g. Matlab and java programming at the same time). [workshop]</p>	17	<p>A system that can be used and synchronized with different devices. In that way, the necessary software is always available.</p>
Tools	<p>On my Windows PC, of course I can use larger font sizes, however the icons are still small. I therefore developed my own 'zoom-button' toggle between magnifying all at once, and the normal displayed size.[PP5_20]</p> <p>I have (congenital) visual problems for which I wear special contact lenses. This results in a clear vision at about 15 cm from my eyes which is less</p>	18	<p>An intuitive and easy to use zoom-function for GUIs, that works, for all information on the screen, including icons. The user should be able to easily toggle between zoom and normal.</p> <p>Link: https://technet.microsoft.com/en-us/sysinternals/bb897434</p>

Theme	Insight	#	Feature idea
	<p>than for normal people (about 20-30cm). Therefore I usually sit very close to the screen, paper or whatever I want to see clearly.[PP5_31]</p> <p>I have a Notebook on which I read documents and can easily add written comments to these documents (touch screen and Papyrus). It also has a zoom-function to enlarge the text of the document, which I really like.[PP6_08]</p>		

A.1.2. Detailed Results

RRD_Subject1

Demographics

- Male
- 56 years old
- Head of Business Information Management
- Full time job at the University of Twente
- Three years of experience in the current function

Tools

- Software: All Office programmes (a.o. agenda), Evernote, pdf reader
- Hardware: Laptop, iPad, Smart phone (with headset)

First impression

- Two photos
- Two audio fragments
 - Fragment 1_interview - pp_1.wma
 - Fragment 2_interview - pp_1.wma



Figure 8 - Office pp_1



Figure 9 - Office pp_1

Insights

Table 17- Insights from pp_1

#	Insights	Physical health & ergonomics	Mental health	Communication	Task management	Tools	Environment	Personal development	Engagement
RRD_PP1_01	I need an outdoor environment in which I can take a (lunch) walk and relax. Because I spend most of work day inside. I also feel this need, because of the back pain I experience.	1	1				1		
RRD_PP1_02	I have an in height adjustable chair and a footrest, however additionally I would like to have an in height adjustable desk. I believe that I am suffering from back pain due to my sedentary job.	1					1		
RRD_PP1_03	Biking to work is very important to me.	1	1				1		
RRD_PP1_04	I work with only mobile devices like a iPad, laptop and smartphone and they all are connected.				1	1			
RRD_PP1_05	The duration of my tasks varies strongly and I can manage my own agenda so that I can plan longer time periods for long tasks in which I do not want to be interrupted, as it takes time to get in the flow after each distraction				1				
RRD_PP1_06	I plan my meetings in the Outlook agenda; long-term tasks in an electronic to-do list and put my tasks for today on post-its. Depending on the urgency, tasks are moved to other 'task managers'				1	1			
RRD_PP1_07	I use my iPad in meetings to work with relevant documents and for taking notes.					1			
RRD_PP1_08	Appointments are scheduled for me, without enough time between them. Too many appointments on a day. I need time between meetings to process information and execute forthcoming tasks.				1				
RRD_PP1_09	I find it important to stay up to date regarding the developments in ICT for education.							1	
RRD_PP1_10	I value the contact with people in my work and continue to learn from this and develop myself.			1				1	
RRD_PP1_11	I like my work because it contains both individual tasks and tasks that requires working together with others.		1	1					
RRD_PP1_12	I feel engaged with my organization and take part in decision-making via the many internal meetings that I have with others from my organization.			1					1
RRD_PP1_13	I wear multi-focal glasses and found out that my laptop helps with that as its screen is at the perfect height for using the 'reading-part' of my glasses.	1				1			
RRD_PP1_14	Risk on a low motivation on individual tasks, without short-term incentives. I need sufficient face-to-face moments to stay in the workflow (motivation).		1	1					
RRD_PP1_15	I work occasionally at home, where I work at the dining table, which provides a nice and quiet work environment.				1				
RRD_PP1_16	When I work at home, I only use the study room when it is too noisy/busy in the living room.						1		
RRD_PP1_17	I need a quiet and pleasant work environment without a lot of distractions especially when I need to concentrate on large documents that I have to read or study. Therefore I often do these type of tasks at home.					1			
RRD_PP1_18	Working at home has the advantage that I more often take short breaks like making coffee, watering the plants, and other small	1					1		

	chores.								
RRD_PP1_19	I like to work with some music on, regardless of my workplace (at work or at home).								1
RRD_PP1_20	Default sound levels are not appropriate. Therefore, I would like to be able to manually adjust the sound levels according to the environment and importance.								1
RRD_PP1_21	I value a pleasant appearance of the work environment, e.g. with some art on the walls and plants.								1
Total number of insights per theme		5	4	3	6	5	8	2	1

Conclusion - Essential features for this subject

- Sound levels and ambiance of the office should be adjusted to different types of tasks (e.g. cognitive tasks and face-to-face meetings). [environment]
- Walking time outdoors in the nature should be part of the day schedule and be encouraged by the system. [environment; task management]
- Task management support to create enough time between meeting to process information and execute forthcoming tasks (e.g. auto suggest time between two meetings in the agenda). [task management]
- A system that provides the newest updates. (e.g. regarding ICT in education). [personal development]

RRD_Subject2

Demographics

- Female
- 61 years old
- Management assistant
- Part time job at RRD
- Six and a half years of experience in the current function

Tools

- Software: Word, Excel, Outlook
- Hardware: PC, desk phone

First impression

- Two photos
- One audio fragment
 - Interview - pp_2.wma



Figure 10 - Office pp_2



Figure 11 - Office pp_2

Insights

Table 18- Insights from pp_2

#	Insights	Physical health & ergonomics	Mental health	Communication	Task management	Tools	Environment	Personal development	Engagement
RRD_PP2_01	I try to perform my job as efficient and structured as possible. I improved this skill a lot during my years of experience, but it still continues to be a challenge, which I like.							1	1
RRD_PP2_02	Because of my many years of experience, I know who to ask for certain jobs. I have a good network.			1	1			1	
RRD_PP2_03	I applied for this job, as it was within my comfort zone. With people I know, so I can profile myself better, and it feels safe.							1	
RRD_PP2_04	Not everybody is happy with his job. It is just how it went in the past. People should be provided with motivators/energizers.							1	
RRD_PP2_05	I have a lot of distraction in my work (like colleagues asking short questions, and phone calls), which takes a lot of unnecessary time.			1	1		1		
RRD_PP2_06	There are no general collective coffee breaks, which I miss for social contact with my colleagues	1		1			1		
RRD_PP2_07	It was hard for me to get used to the fact that I needed to share a room with a colleague, while I had an office for myself in my previous job.		1				1		
RRD_PP2_08	An outdoor environment is important to me.		1				1		
RRD_PP2_09	Biking to work is very important to me.	1					1		
RRD_PP2_10	I print my tasks from the mail and classify them based on urgency.				1	1			
RRD_PP2_11	Outlook is the start of the day and my to-do list of the day				1	1			
RRD_PP2_12	I do not like to take notes, because elaborating them takes a lot of time. After a long meeting I am already tired and especially then I need my concentration to formulate a coherent story which is even more exhausting. Staying focused is harder when there is a lot of distraction from colleagues walking in and phone calls which I have to answer for both me and my colleague with who I share the office.		1		1				
RRD_PP2_13	It is easier for me to transfer information and knowledge to people I know, but it is also important to find a way to easily train newly hired employees who are complete strangers to me.			1	1				
RRD_PP2_14	Transferring tasks to others is difficult, because there is no 'universal method' applied. So the newly hired employee needs to learn details one-on-one. There is a need for a system that can capture working methods to learn in a more efficient way (LMS).			1	1				
RRD_PP2_15	I need something that tracks all unfinished mail conversations (e.g. waiting on a response for a meeting)			1	1				
RRD_PP2_16	The meetings of which I take the notes, are often planned close to one another, instead of well distributed over the working days, making it hard to find enough time to work up my notes.				1				
RRD_PP2_17	Agenda management of the CEO is challenging because of the complex meetings that need to be planned, with dependencies on many aspects and people.		1		1				

#	Insights	Physical health & ergonomics	Mental health	Communication	Task management	Tools	Environment	Personal development	Engagement
RRD_PP2_18	I wish for a clean desk at the end of a day (instead of unfinished tasks / post-its / prints of emails). It gives a good and satisfying feeling of having Things Done.		1		1				
RRD_PP2_19	I used to do two different jobs. I wanted to do the work on different days of the week, which was not possible because some tasks required immediate action e.g. planning a meeting with several stakeholders, causing both jobs to blend.				1				
RRD_PP2_20	My manager is so busy, that he doesn't have enough time for our weekly work progress meeting (regarding tasks, decisions etc.), which makes it difficult for me to manage his agenda and support his work as a PA (personal assistant).				1				
RRD_PP2_21	The variation in my workdays provides me energy. This variation is based on the attendance of my manager, colleagues walking into my office, the number of planned meetings in which I take the notes and whether or not I have the phone-shift.				1				
RRD_PP2_22	It was hard for me to get used to longer working days (till 5 pm) instead of half past 2 in the afternoon.		1						
Total number of insights per theme		2	6	6	14	2	5	4	1

Conclusion - Essential features for this subject

- Creating a quiet and pleasant environment appropriate for cognitive demanding tasks (e.g. a ‘do not disturb sign’ while working up notes). Possibly, extended with a task management tool that signals others on the type of task that one is working on, so that interruptions can be done at the moment which fits best (e.g. during tasks with low cognitive demands). [task management]
- A task management tool that can help with planning the tasks that suits best with the dynamic environment (e.g. attendance of colleague with who the office is shared). [task management]

RRD_Subject3

Demographics

- Male
- 59 years old
- Architectural consultant for age-related home modifications
- Fulltime job at the local government of the city of Hengelo
- 37 years of experience in the current function

Tools

- Software: Outlook (for email, agenda)
 - Dedicated software for handling requests.
 - Dedicated software for financial planning.
 - Dedicated software to comment on constructional drawings of buildings
- Hardware: Smartphone, desk phone, PC

First impression

- One photo



Figure 12 - Office pp_3

Insights

D2.1 Report on User and Stakeholder Requirements

Table 19- Insights from pp_3

#	Insights	Physical health & ergonomics							
		Mental health	Communication	Task management	Tools	Environment	Personal development	Engagement	
RRD_PP3_01	I have no difficulty keeping my two jobs separated in time and tasks.			1					1
RRD_PP3_02	I have two jobs in the same field. One day per week I work as a consultant as a free agent, and four days per week as an architectural consultant at the local government.		1	1				1	
RRD_PP3_03	I like to work with the radio on.				1	1			
RRD_PP3_04	I can log into the system from home, which I rarely do for my job as a structural consultant. Only for urgent emails and/or appointments for the coming week.			1		1			
RRD_PP3_05	I love my job as it has a nice balance between house-visits and office tasks (such as meetings). I advise in structural modifications of buildings, based on medical needs.			1		1			
RRD_PP3_06	One day a week I work at home as a consultant. My workplace at home is a small room with a desk, PC and radio.			1		1			
RRD_PP3_07	I don't think it is possible to create a personal work-environment in flexible workplaces.	1				1			
RRD_PP3_08	I find it important to have nice work-environment (e.g. plants and personal belongings), because a large proportion of human-life is at work.	1				1			
RRD_PP3_09	I can work as good at home as at my office at the local government.						1		
RRD_PP3_10	I start my day by planning activities based on the email and appointments in my agenda.			1	1				
RRD_PP3_11	I use Outlook and a number of dedicated software programs to handle requests, financial planning and comment on constructional drawings of buildings.			1	1				
RRD_PP3_12	Meetings which result in better product give me energy.	1	1	1					
RRD_PP3_13	I plan most meetings in Outlook. I plan them by myself, but others can also see my agenda to make suggestions for appointments.		1	1					
RRD_PP3_14	I prepare all paperwork in the morning that I will be needing for house-visits later that day.		1	1					
RRD_PP3_15	The type of tasks at a workday depend strongly on internal and external meetings.		1	1					
RRD_PP3_16	Within the local government of Hengelo I am the only one performing this specific job (no full back-up).		1	1					
RRD_PP3_17	I like to start my workday early. I arrive at work at 7:15 AM and this is possible because we use flexible working hours for employees. (e.g. one can start between 7:30 AM and 9:00 AM)	1		1					
RRD_PP3_18	I only like short meetings, otherwise I get bored.	1		1					

RRD_PP3_19	Within the regulations of the local government I find it a challenge to get the best solutions for the clients. (creative solutions; out of the box thinking)	1	1						
RRD_PP3_20	I want take a short walk every half-hour to prevent to prevent myself from back pain.	1		1					
RRD_PP3_21	I structure and memorize my tasks in my mind.				1				
RRD_PP3_22	Requests from clients are stored in a system and ordered based on date of the request and urgency defined by other consultants and myself. I work according to this order.					1			
RRD_PP3_23	I find it important to keep to agreements.				1				
RRD_PP3_24	I find it important to quickly respond to email and expect others to do the same, which is not often the case.					1			
RRD_PP3_25	I prefer using the stairs over the elevator	1							
RRD_PP3_26	I sometimes suffer from back pain.	1							
Total number of insights per theme		3	6	8	18	3	7	1	1

Conclusion - Essential features for this subject

- A nice and personal work-environment (e.g. plants and personal touches).
- Need to be motivated to take sufficient short breaks to stay physically active (to prevent back pain). [task management, physical health & ergonomics]

RRD_Subject4

Demographics

- Male
- 59 years old
- Owner of a computer shop ATRAS: He repairs Windows- and Apple-systems, smartphones etc.
- Fulltime job at ATRAS (self-employed person, without personnel)
- 15 years of experience in the current function

Tools

- Software: Outlook (agenda and contacts)
- Hardware: PC, desk phone

First impression

- One photo



Figure 13 - Office pp_4

Insights

Table 20- Insights from pp_4

#	Insights	Physical health & ergonomics							
		Mental health	Communication	Task management	Tools	Environment	Personal development	Engagement	
RRD_PP4_01	I like to be a free agent, and being responsible for my own company, without a manager breathing down my neck	1		1					1
RRD_PP4_02	In earlier functions I struggled to function in organizations with a hierarchical structure.		1						1
RRD_PP4_03	The business fully depends on its regular customers, and thereby on its reputation of quality and service.		1					1	
RRD_PP4_04	My family finds it more difficult to keep work and private separate and disturb regularly with brief questions.	1	1	1		1			
RRD_PP4_05	I love the fact that my company is part of my home. However, I have no problem keeping private and work separated.	1				1			
RRD_PP4_06	The advantages of working at home are more important to me than the disadvantages.	1				1			
RRD_PP4_07	I use my worktop-paper (A1) for taking notes during the repair-activities, and when a task is finished I summarize this information into invoices for the customers on my PC.		1	1	1				
RRD_PP4_08	I manage my agenda and customer databases in Outlook on my Desktop PC .			1	1				
RRD_PP4_09	I manage my repairs by using stickers on which I print customer details via my PC.			1	1				
RRD_PP4_10	Because of my (congenital) back problems, I find it very important to have an ergonomic adjustable work environment. I have created a high work desk at which I can stand. And bought a in height adjustable surgeon's seat (high chair like a barstool).	1			1				
RRD_PP4_11	I find it difficult to structure time demanding tasks (e.g. repairing technology) vs. ad-hoc questions of customers.		1	1					
RRD_PP4_12	Depending on the size of the task, I do them immediately (customer can wait for it) or I plan to do the repair in the upcoming two days.		1	1					
RRD_PP4_13	New challenges boost my energy, e.g. repairing the newest iPhone. Repairs that I am already familiar with, are not challenging, and therefore not interesting to do ('boring').	1		1					
RRD_PP4_14	I have lung problems, which reduces my capacity to lift heavy weights and my working pace.	1		1					
RRD_PP4_15	I have about 10-15 customers a day, which I can serve well within my available time.			1					
RRD_PP4_16	I manage my tasks based on the 'energy I get from the tasks'. The tasks that are the most fun to do, are planned first, followed by the more 'boring' tasks.			1					
RRD_PP4_17	My lung problems directly affect conversations with customers. Sometimes I cannot finish a conversation, because I am out of breath.	1	1						
RRD_PP4_18	Virtue: I find it important to take enough time to serve and help the customer, as they also take the time to come to my shop.		1						
Total number of insights per theme		3	5	8	11	4	3	1	2

Conclusion - Essential features for this subject

- A task management tool that can help with planning the tasks that suits best with the dynamic environment (e.g. customers walking in the shop with questions vs. time demanding repairs). [task management]
- Creating a quiet and pleasant environment appropriate for cognitive demanding tasks (e.g. a 'do not disturb sign' while working up notes). Possibly, extended with a task management tool that signals others on the type of task that one is working on, so that interruptions can be done at the moment which fits best (e.g. during tasks with low cognitive demands). [task management]

RRD_Subject5

Demographics

- Male
- 52 years old
- Senior researcher
- Fulltime job at RRD
- Ten years of experience in the current function

Tools

- Software: Outlook (including GTD system), OneNote, and all Office programmes. The Cloud, Labview, Matlab, SPSS.
- Hardware: smartphone, desk phone, PC

First impression

- Two photos

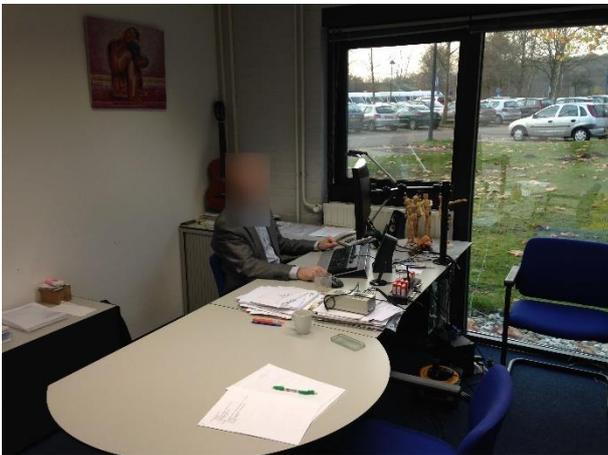


Figure 14 - Office pp_5



Figure 15 - Office pp_5

Insights

Table 21- Insights from pp_5

#	Insights	Physical health & ergonomics	Mental health	Communication	Task management	Tools	Environment	Personal development	Engagement
RRD_PP5_01	I like my job as an independent researcher, as I can practice my creative ideas in research. And I find it important to only work on projects which I fully believe in and enjoy working on.	1						1	1
RRD_PP5_02	Currently I am working on optimizing my work structure, including reducing the number of times I check my email. However, I always start my workday with checking my email.				1	1		1	
RRD_PP5_03	I took the initiative to implement the Getting-Things-Done (GTD) methodology in Outlook, as I want to learn how to further structure long and short term tasks. So I can function more efficient.				1	1		1	
RRD_PP5_04	In the past I sometimes did not met the deadlines as I wanted to deliver 'too good or beautiful' products. I learned from these experiences and try to work on it.				1			1	
RRD_PP5_05	I like to work on practical problems together with the end-users. However, this is a very time-consuming process, consisting of user requirements analysis and expectance management.			1				1	
RRD_PP5_06	I have developed myself in this job, e.g. on how to sell a product-idea to get it funded and how much effort development really needs.			1				1	
RRD_PP5_07	I like the content of meetings with external partners, as they bring more new, creative ideas and solutions to learn from.			1				1	
RRD_PP5_08	I get inspiration for technical innovations from real world problems such as how to attach a sensor comfortably to the human body.	1						1	
RRD_PP5_09	I use my PC at home for work and voluntary work.					1	1		
RRD_PP5_10	At home I have a workplace like here. With a in height adjustable screen, so my kids can also use the workplace. This room is also well lit.					1	1		
RRD_PP5_11	I have a back-up from my files and can also use the network drive from RRD at home.					1	1		
RRD_PP5_12	The devices I use at home are private property.					1	1		
RRD_PP5_13	I prefer working at my office, because at home my four children distract me a lot.					1	1		
RRD_PP5_14	My workdays vary depending on meetings, international conferences etc.				1		1		
RRD_PP5_15	At home I do all tasks that need to be finished.				1		1		
RRD_PP5_16	At home I usually work in the evenings or weekends.				1		1		
RRD_PP5_17	I used to take lunch walks with a colleague, but not anymore	1					1		
RRD_PP5_18	I like to work on concrete products/services that will be used in practice and are considered useful in the domains of Healthcare, Sports and Economy.		1			1			
RRD_PP5_19	My computer screen mounted on a support that I can easily move towards me.	1				1			

D2.1 Report on User and Stakeholder Requirements

#	Insights	Physical health & ergonomics	Mental health	Communication	Task management	Tools	Environment	Personal development	Engagement
RRD_PP5_20	On my Windows PC, of course I can use larger font sizes, however the icons are still small. I therefore developed my own 'zoom-button' toggle between magnifying all at once, and the normal displayed size.	1				1			
RRD_PP5_21	I find it important to have a good Wi-Fi connection for employees and guests in the office building. This connection is currently not sufficient.					1			
RRD_PP5_22	I value good coffee for myself and my guests. The current coffee quality is not to my taste.					1			
RRD_PP5_23	Actually, I have three jobs. I work at the RRD, am deployed at the university of applied science and am one of the founders of a start-up company. And in my free-time, I am a volunteer in the board of the neighborhood council and do the finances of my wives company. Combining all these functions is quite challenging.		1	1	1				
RRD_PP5_24	My day plan can be easily changed by unforeseen interruptions, like a phone call resulting in an urgent task or a colleague walking in with a question. I don't mind this, as long as it is within certain time-boundaries.			1	1				
RRD_PP5_25	I would prefer to have all appointments at one day, and have no interruptions at the other days. However, that is not possible due to the agenda of others with who I work.			1	1				
RRD_PP5_26	I try to combine all functions, by correctly managing the expectations of others, and to inform them in time about my progress.			1	1				
RRD_PP5_27	My function specific tasks consists of internal and external meeting and virtual meetings (via skype and TeamViewer), and generating texts and data analysis.				1				
RRD_PP5_28	I also have general administrative tasks, like writing reports, project proposals, and overall project management.				1				
RRD_PP5_29	I find it important to keep to agreements.			1					
RRD_PP5_30	I do have individual tasks, but like working with others more.			1					
RRD_PP5_31	I have (congenital) visual problems for which I wear special contact lenses. This results in a clear vision at about 15 cm from my eyes which is less than for normal people (about 20-30cm). Therefore I usually sit very close to the screen, paper or whatever I want to see clearly.	1							
RRD_PP5_32	I do not have a driving license as I have limited vision. Currently, rules have changed, which provides the possibility to take special driving lessons. However, I don't feel the need anymore. If I have to travel for my job, I'm just as happy to travel by train, as it also provides the opportunity to work while travelling. And I always commute by bike.	1							
Total number of insights per theme		5	4	9	12	12	9	8	1

Conclusion - Essential features for this subject

- Support like the Getting-Things-Done (GTD) methodologies, integrated in Outlook, to further structure long and short term tasks and to function more efficient. (E.g. to prevent spending too much time on 'too good or beautiful' products, resulting in a missed deadline). [task management]
- An intuitive and easy to use zoom-function, for all information on the screen, including icons. The user should be able to easily toggle between zoom and normal [tools]

RRD_Subject6

Demographics

- Male
- 54 years old
- Scientific director, rehabilitation physician
- Parttime job at RRD (4/10 RRD, 3/10 University of Twente, 3/10 Medisch Spectrum Twente)
- Eight years of experience in this combination of functions

Tools

- Software: all Office programmes, Papyrus, EPD and other hospital specific programmes.
- Hardware: Notebook, laptop, deskphone, smartphone

First impression

- Two photos



Figure 16 - Office pp_6



Figure 17 - Office pp_6

Insights

Table 22 - Insights from pp_6

#	Insights	Physical health & ergonomics	Mental health	Communication	Task management	Tools	Environment	Personal development	Engagement
RRD_PP6_01	I chose this job, because it is a combined function of being a professor and a director of a research institute specialized in rehabilitation technology.				1				1
RRD_PP6_02	I find it a challenge to figure out which products are needed and helpful for rehabilitation services/care.					1		1	
RRD_PP6_03	I really like to be the CEO of this research institute and enjoy working with the Management Team. And once in a while also work on applied research myself. However, the business management of the institute is not my favorite task, because I do not have enough time to do it in a proper manner.		1	1	1				
RRD_PP6_04	I sometimes find it hard to combine all these functions within the available time.				1				
RRD_PP6_05	I really like the fact that, because of my function I meet all sorts of people and have the opportunity to promote our institute in their companies.		1	1	1				
RRD_PP6_06	My management assistant plans all my upcoming tasks and meetings. Sometimes I also plan them on my own, but always inform my assistant by email.				1				
RRD_PP6_07	I have a notebook for all my work activities and a PC at home for private activities, and keep these strictly separated. However, I almost always use the laptop.					1			
RRD_PP6_08	I have a Notebook on which I read documents and can easily add written comments to these documents (touch screen and Papyrus). It also has a zoom-function to enlarge the text of the document, which I really like.					1			
RRD_PP6_09	I really like working on my Notebook as I can easily read and comment on documents while sitting on the couch.					1	1		
RRD_PP6_10	I like the variation in workplaces, because of my combined functions.						1		
RRD_PP6_11	I can easily switch between tasks and functions, but I have such a tight schedule that I do not have time to take a break to eat (e.g. lunch- or coffee break).	1			1				
RRD_PP6_12	During my years as a scientific director I primarily learned a lot regarding communication-, leadership- and management skills. This continues to be an ongoing learning process.							1	
RRD_PP6_13	I find it important that employees can easily reach the management team for questions, suggestions, etc. And I value their input in decision making.								1
RRD_PP6_14	Young and innovating personnel keep me enthusiastic in my work and create a dynamic work environment.		1				1		
RRD_PP6_15	In my job I primarily collaborate with others (teamwork) and like this better than individual tasks (writing/reading articles).								1
RRD_PP6_16	I get energy from project meetings and new developments.		1	1					
RRD_PP6_17	During the daytime I do not have time for my email, therefore I do this in the evening at home. I would like to have a dedicated hour during the day for this task.					1	1		
RRD_PP6_18	This job takes more time than a regular 9-5 job.					1			1

#	Insights	Physical health & ergonomics	Mental health	Communication	Task management	Tools	Environment	Personal development	Engagement
RRD_PP6_19	All week evenings I work at home at the dining table on my laptop. This posture gives me back pain.	1				1	1		
RRD_PP6_20	At the moment I do not perform any physical or mental exercises at work. However, I think it would be good for me to do this.	1							
RRD_PP6_21	Working at home in the dining room gives me the feeling that I am part of the family.						1		
RRD_PP6_22	At home I often perform cognitive demanding tasks like reading a thesis, reviewing books, etc.				1				
RRD_PP6_23	At the office I primarily work on short tasks like answering quick emails and other short tasks.				1		1		
RRD_PP6_24	I chose to visit colleagues in their office for short questions and updates. I like the social aspect of this. And it will get me out of my office.			1	1		1		
RRD_PP6_25	I think PEARL can do more for employees with more monotonous tasks. I have no time for training activities.				1	1			
RRD_PP6_26	I have various workspaces in which I do not always feel at home. I think I can benefit from RFID-solutions to personalize my work environments.						1		
RRD_PP6_27	RRD has two flexible workspaces, which are often used by part-time employees and students. These flex-workers can benefit from RFID-personalization. They can feel more comfortable at their workplace with this personalization vs. placing personal tangibles.						1		
Total number of insights per theme		3	4	6	12	6	10	2	2

Conclusion - Essential features for this subject

- A RFID-tool that personalises an office within so to speak, one push on the button. [environment]
- Need to be motivated to take sufficient short breaks to stay physically active. [physical health and ergonomics]
- A tool that prevents long periods of sitting in a bad position (e.g. at a kitchen table with a laptop). [physical health and ergonomics]

A.2. Interview schedule- Human Resource Manager

A.2.1. Before the start of the interview

Short description of the method

After the definition of target groups to be included in the requirements research for other stakeholders for each site, it is suggested to use **semi-structured single interviews** because of their capacity to allow the participant to reveal what is important to them and to share their world with the researcher, while at the same time giving the interviewer a schedule of topics to introduce into the interview to stimulate discussion during the interview. Topics do not have to be covered in a particular order. What is important is allowing the person to reveal their inner perspectives rather than confirming our researcher preconceptions.

Semi-structured interview schedules are used to facilitate the flow of the interview and to allow the participants inner perspective to be revealed. Interview schedules will be topic based whereby the research questions are broken down into specific topic areas (cf. further below). The interviewers' job is to discover what participants think and feel about these topics as well as revealing topics which are important to the participants and which might have been unanticipated at the design stage of the interview. This guidance document aims at facilitating this work.

Who should you talk to

A Human-Resource Manager is normally an individual within an organization responsible for hiring new employees, supervising employee evaluations, skills development and further education, mediation between employees and managerial staff as necessary, and general overseeing of the personnel department.

However, as we are dealing often with smaller organisations there might not necessarily be an appointed human resource manager. Thus, we kindly ask you to identify the person in the company who is responsible for:

- Skills & training of employees
- Hiring new employees
- Health & safety issues

As also different people in the company are responsible for the topics listed above, the right interviewee needs to be defined per topic. More detailed guidance on how to select the right respondent(s) please see document "Before you start".

Using this schedule

Generally it is described in each part of the schedule below what you have to do. Parts of the schedule need to be completed during the interview, others afterwards. You can take a printed version of the schedule to the interview to make hand-written notes. For this you can also use additional sheets of paper, if necessary.

After the interview, all information needs to be typed in English language into this schedule document, and the document sent to empirica. Make sure that you store a copy of the filled-in schedule at your own premises.

A.2.2. Interview schedule

General information to note down

Please complete the table below during the interview.

Date of the interview		
Time of the interview	Start time:	End time:
Job title of interviewee		
Topics covered:		
Skills & training of older employees	[] yes	[] no
Hiring new employees	[] yes	[] no
Health & safety issues	[] yes	[] no
Name of interviewer		

Introduction

- *Introduce researchers: give your name or names and explain your role as an interviewer.*
- *Introduce the PEARL project: briefly introduce the PEARL project. You can e.g. use the introductory text from the PEARL website: <http://www.pearl-project.eu/>. You can also hand out the project information sheet to the participants.*
- *Explain purpose of the interview: briefly explain how PEARL conducts requirements research with different stakeholders that will in this way have a say in how PEARL will look in the end. More information about the purpose of the requirements analysis can be found in the Guidelines Document.*
- *Consent form: use the Consent Form provided with the schedule and the Guidelines. Note that the form MUST be filled in and signed by every interviewee. Make sure to collect the completed form after the interview and store it safely at your premises for future reference.*

Respondent's main points of contact with older employees in the company

Ask respondent to describe his/her main areas of responsibility:

Find out whether respondent is responsible for or has knowledge about
 1) Organisation skills development and training of older employees in the company

→ *If respondent is not responsible for or has no knowledge about the topic, SKIP this topic in the interview schedule and refer question to another appropriate stakeholder.*

2) Hiring (decision processes, company policy in this regard) of older employees

→ *If respondent is not responsible for or has no knowledge about the topic, SKIP this topic in the interview schedule and refer question to another appropriate stakeholder.*

3) Health & safety issues in the company

→ *If respondent is not responsible for or has no knowledge about the topic, SKIP this topic in the interview schedule and refer question to another appropriate stakeholder.*

Investigate points or procedures of contact that the respondent has with older employees in the company, e.g. whether

- the respondent has regular personal (and/or email) contacts with older employees and what the main topics/motives for these contacts are
- there are regular meetings or assessment sessions taking place
- a dedicated reporting structure for issues or concerns exists in the company

Topic A: Skills & training of older employees

*Main areas where respondent sees problems relating to **training / continuous vocational education** of older people in the company (either voiced by older employees themselves or by others in the company) [Complete during interview]*

Description of each problem area named [Complete during interview]

Ask respondent whether he/she can think of any potential solutions to the prob-

Items discussed above *[Complete during interview]*

Resulting requirements *[Complete after interview]*

Topic B: Hiring of older employees

*Main areas where respondent sees problems relating to **hiring older people in the company** (either voiced by older employees themselves or by others in the company) *[Complete during interview]**

Description of each problem area named *[Complete during interview]*

Ask respondent whether he/she can think of any potential solutions to the problems discussed above *[Complete during interview]*

Resulting requirements *[Complete after interview]*

Topic C: Health and safety issues in the company

*Main areas where respondent sees problems relating to **health and safety** of older people in the company (either voiced by older employees themselves or by others in the company) *[Complete during interview]**

Description of each problem area named *[Complete during interview]*

Ask respondent whether he/she can think of any potential solutions to the problems discussed above *[Complete during interview]*

Resulting requirements *[Complete after interview]*

A.3. Co-workers Workshops

Demographics

- N= 24 (employees of RRD)
 - Male = 8
 - Female = 16
 - Age ($M = 30,5, SD = 7,6$)
 - Contract hours ($M = 33,5, SD = 5,4$)

Table 23 - Number of devices used by number of employees

Number of devices in use	Number of employees using these devices
1	1
2	8
3	12
4	4
5	1

Insights

Table 24 - Insights derived from the co-workers workshop at RRD

Insights	Physical health & ergonomics	Mental health	Communication	Task management	Tools	Environment	Personal development	Engagement
Working in a (small) team. I get energy from working together and completing the job with good results.			1	1				
I prefer working in teams, but to work on own tasks and talk about those tasks together. We have regular external meetings and conference calls.			1	1				
Workdays tend to be different. Not very different, but I don't like it when they are the same.				1				
I don't have specific tasks but it is nice to do different tasks (variety of tasks) during the day.				1				
I have different workplaces: the office, home and sometimes the library. I like to change my workplace when I need a concentration boost.						1		
Every morning I try to set the goals for the day and prioritize them. The day is over when at least the most important goals are achieved.				1				
Sometimes I set goals and sometimes I reach them.				1				
I look on my to-do list what needs to be done and then I start the day. Sometimes I have enough time to finish it all and sometimes I do not.				1				
It would be nice if there is an easier way to compare my own private agenda with my work agenda, this makes it easier to plan appointments.				1	1			
I prefer to manage my to do lists and documents digitally, so I can easily combine them with my personal notes.				1	1			
I keep the long term tasks digitally in a program in which I can easily open and adjust them.				1	1			
I prefer to manage my notes and to-do's digitally, because I have various workplaces. Otherwise I have to carry it all with me on paper and then probably things								

will get lost.				1	1			
I like to have contact with colleagues, but I am traveling a lot or working on other places. Therefore would it be nice to have some kind of chat program maybe in combination with a video function.			1					
There needs to be a more informal way to communicate with colleagues, other than by e-mail.			1					
When working from home I only use my laptop. Sometimes it is difficult to work on my laptop, because I do not have all the software installed that I need (e.g. SPSS). In addition, my computer does not have enough computation power to perform certain demanding tasks (e.g. Matlab and java programming at the same time).					1	1		
Creative tasks like developing something new or analysis of the data give me energy. E.g. creating a recommender system for exercises.		1			1			
Data analysis in Vicon is less appealing to me, as it tends to be a bit boring and not so challenging.		1			1			
The Cloud is an energy saver. I can easily find my own work and share this information with others.					1			
Total number of insights per theme	0	2	4	11	8	2	0	0

Conclusion - Essential features from the co-workers workshop

- A RFID-tool that personalizes a workplace within so to speak, one push on the button. [Environment]
- Support like the Getting-Things-Done (GTD) methodologies, integrated in Outlook, to further structure long and short term tasks and to function more efficient. (E.g. to prevent spending too much time on 'too good or beautiful' products, resulting in a missed deadline). [Task management]
- An intuitive tool that can combine different types of agendas. [Task management; tools]
- A program in which different types of notes can easily be stored, combined and adjusted (e.g. Notepad). [Task management; tools]
- There is a need for an informal way of communicating with colleagues other than by email, which is also available while traveling and at other workplaces. IRC (Internet Relay Chat) might be a possible solution. [Communication]
- A system that that can be used and synchronised with different devices. In that way, the necessary software is always available. [Tools; environment]
- A system that supports creativity through mental challenges. [Tools; mental health]
- The Cloud, can easily be used to share information with others. [Tools]