Active Older Adults @ Workplace

D5.03 – Operational Scenario Results

Project Deliverable

D 5.3 Operational Scenario Results

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1.0	18/07/2017	ATOS	Final version submitted to the AAL CMU

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1. Executive Summary

D5.3 aims at presenting the Active@Work pilots second phase. The deliverable reflects the outcomes of the tasks T5.2 and T5.3.

As soon as the platform and the recruitment process was completed, the pilot execution was performed in two different locations and involving 25 participants. The pilots were divided in two phases: (1) The first phase, in 2016, that started in September 24th and ended October 12th, was focused in fixing the main bugs, improving existing functionalities and eventually adding new functionalities based on the user feedback. (2) The second phase, in 2017, that started on March 13th and ended on May 31st, was mainly focused in the usability aspects of the solution. Usability was evaluated according to the users' feedback in terms of ease of use, the system's impact and their satisfaction.

This deliverable describes all the activities carried out in both pilots, the evaluation performed with the users, and the refinements developed for this second phase.

2. Introduction

This document describes the second phase of the pilots (Indoor and Outdoor) in the Active@Work project both of them have been successfully completed. This second phase has been focused on the usability and functionality of all modules, after the improvements developed at the end of the first phase and presented in deliverable D5.02.

This report examines the second phase of the pilots in terms of refinements achieved, activities performed and lessons learned after the evaluation process.

The present document is organized in the following structure:

- Chapter 1, Executive Summary
- Chapter 2, Introduction
- Chapter 3 Pilot overview, which covers a brief description of both pilots as well as a table with the refinements made to all modules, based on the user feedback and the timeline changes.
- Chapter 4 Outdoor Pilot – phase 2, summarises the activities performed along the pilot in Belgium.
- Chapter 5 Indoor Pilot – phase 2, summarises the activities performed along the pilot in Madrid related to training, incident detections and timeline.
- Chapter 6 Evaluation Process provides an evaluation of the pilots against project objectives.
- Chapter 7 Conclusions, highlights the lessons learnt based on the evaluations and suggestions from the participants.
- Annex I which includes a training presentation in Spanish.

3. Pilot overview

3.1. Description of pilots

This section briefly summarises what we have stated in deliverables D5.1 and D5.2 related to pilot overview.

The Active@Work pilots have been deployed in two different locations: Spain and Belgium. One pilot was performed in an Indoor environment, within an international information technology Services Company, ATOS, which is located in Madrid in a four floors building with meeting rooms in all floors. The other pilot is deployed in an outdoor environment, in a leisure park located in Belgium. The total numbers of participants in both pilots are 25 (10 participants for the Indoor pilot and 15 participants for the Outdoor pilot).

Both pilots have been deployed in two phases in order to take advantage of the participants' feedback at first phase and improve the solution for the second phase.

To coordinate both pilots, the following steps were defined:
   a) Each participant tests the system
   b) Every time an error, an unexpected behavior or a perceived missing functionality is detected, this issue must be reported (Incident template)
   c) the technical partners in charge of solving the issue take care of it, performing restricted meetings if necessary (shared excel file)
   d) A new release of the component is prepared
   e) All the volunteers and the technical partners are notified
   f) During the follow-up meetings all the points are revised and open issues are discussed all together

3.2. Pilot Timeline

According to the figure below, the timeline presented has suffered a slightly change with respect of the one showed in deliverable D5.2. The outdoor pilot was delayed because the resources to this implementation (personal and material) were not available at that very moment in time, however this delay did not mean any substantial changes in the results.

As we have mentioned in our previous deliverables, we have divided the testing phase in two iterations. The first phase started in 2016, involved 12 participants and the results were used as based to improve each modules for the second phase. The second phase started on March 2017, involved 13 participants and was focused on the usability and functionality of the different modules after the improvements.
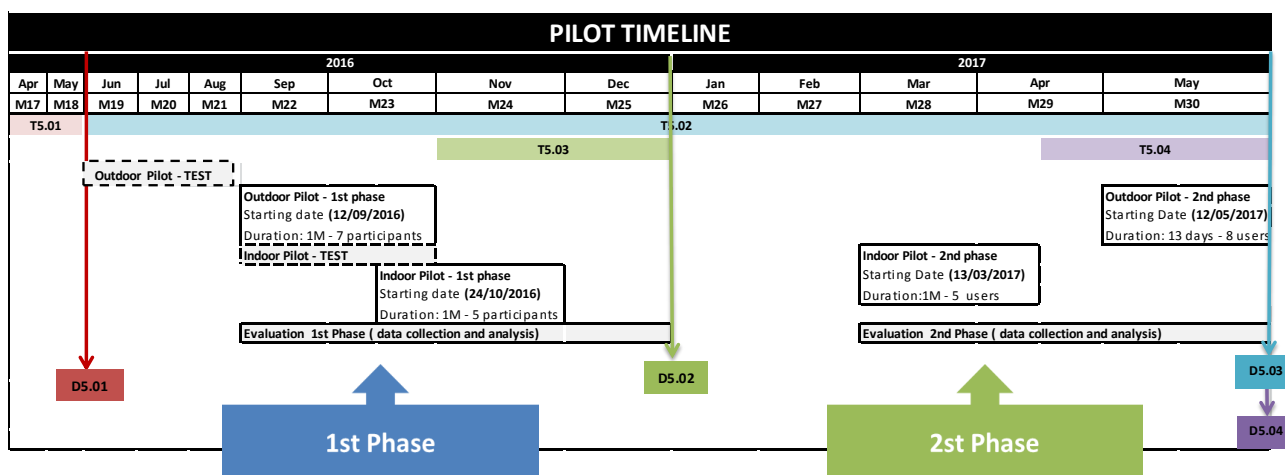
PILOT TIMELINE

Figure 1: Pilot timeline

3.3.   Improvements for the second phase

According to the evaluation of the first phase of the pilots - and thanks to the participants' feedback - the consortium collected and analyzed valuable information related to usability, technical and functional aspects of the solution that helped us to detect improvements and weakness of the system. Those improvements were   included in deliverable D5.02 and it is summarised in the table below.

MODULE	DESCRIPTION	FINISH FOR PHASE 2	REASON
COGNITIVE MODULE (Smartphone & Server side)	• Activate notifications for all users	Y	
	• Integrate a questionnaire	Y	
	• Improve debugging information	Y	
	• Daily reset of some parameters	N	Parameters turned out not useful
	• Add the unit in the overview of bio parameters	Y	
SKILL DEVELOPMENT MODULE	• Finish the development of the module	Y	
	• Integrate with the rest of the modules	Y	
	• To include default data in the module.	Y	
COLLABORATIVE MODULE, MENTORING TOOL	• Ask for Mentoring	Y	
	• Integrate Mentoring tool with Skill module	N	Functionality with many technical requirements that could not be implemented at this stage of the project.
	• Show alert notification if the logged user has a new message or unread messages	Y	
	• Show access from VAT to mentoring tool in order to improve user communication	Y	
	• Navigation improvements	Y	

It is worth to notice that most of these comments and suggestions from the participants have been achieved for the second phase of the pilot; therefore, the presented prototype contained fully functional features and services. Additionally, there is a new module and a feature in the second phase that was not previously included and it is briefly explained below:

a) **Questionnaire on wellbeing;** It is a very simple questionnaire that all participants have to answer every day at the end of their working day. Their answers, along with the body sensors data gathered from each participant, can detect abnormal combinations of heart rate, activity and body temperature. When such event occurs, the module sends a message to the participants inviting them to follow some well-being courses or exercises.

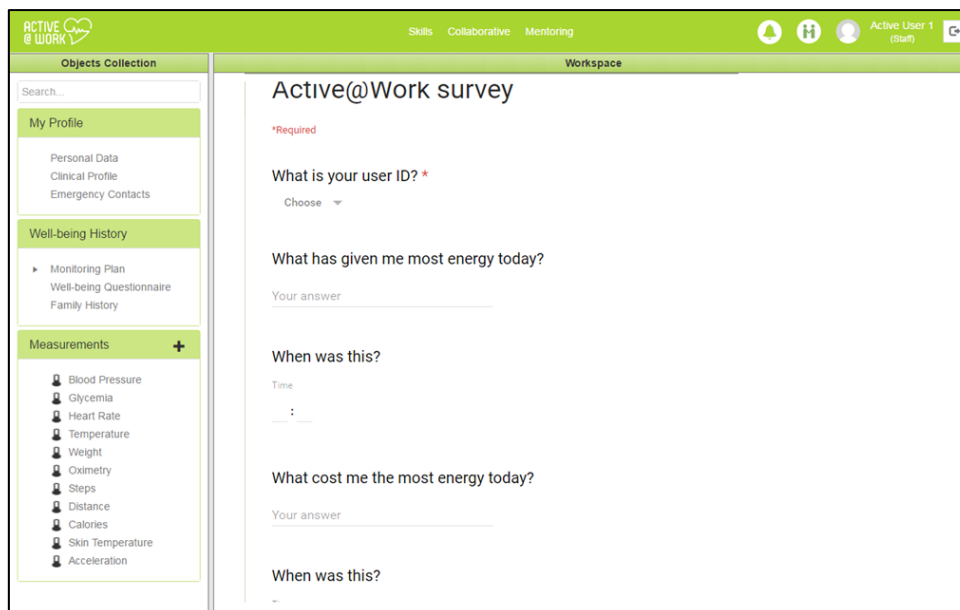*Figure 2: Wellbeing questionnaire*

b) **Skill development module:** The development of this module has been finished for the second phase; it is a module that helps the users to improve their Curriculum Vitae and expertise, keeps them aware of their global classification and informs about soft and hard skills that they should acquire to improve their Curriculum Vitae.
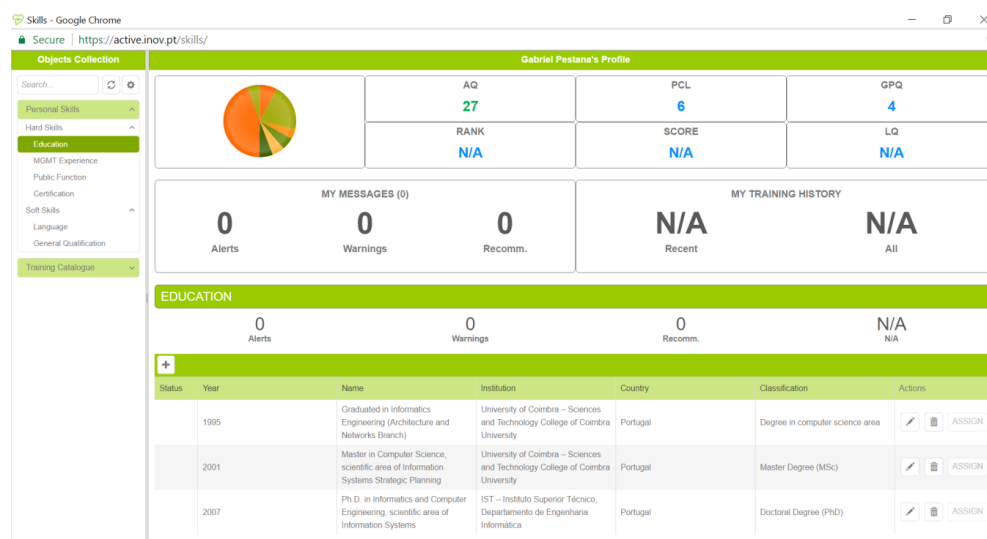
Figure 3: Skill Development module

4. Outdoor pilot – phase 2

4.1. Initial setup

Compared to the first phase a new component was added to the system. The data was sent to the INOV server and then also sent to the system developed by SENS for visualization of statistics. The management was given access to the dashboard so they could follow up the information collected during the test.

Also the installation of beacons in the cottages was modified. Compared to the first phase there are now multiple beacons in one cottage. In total we equipped the cottage with 5 beacons in different rooms. This aim is to determine where the cleaning ladies spend most of their time and have the hardest physical work.

Figure 4: Deployment of beacons in the cottage

4.2.   Refinements

Compared to the first phase, the management of Centerparcs requested insights into the exact room the activity was performed in. The way to determine the level of activity the number of steps and calories reported by the band was inadequate too. In the second phase the accelerometer in the band was used to determine the level of activity.

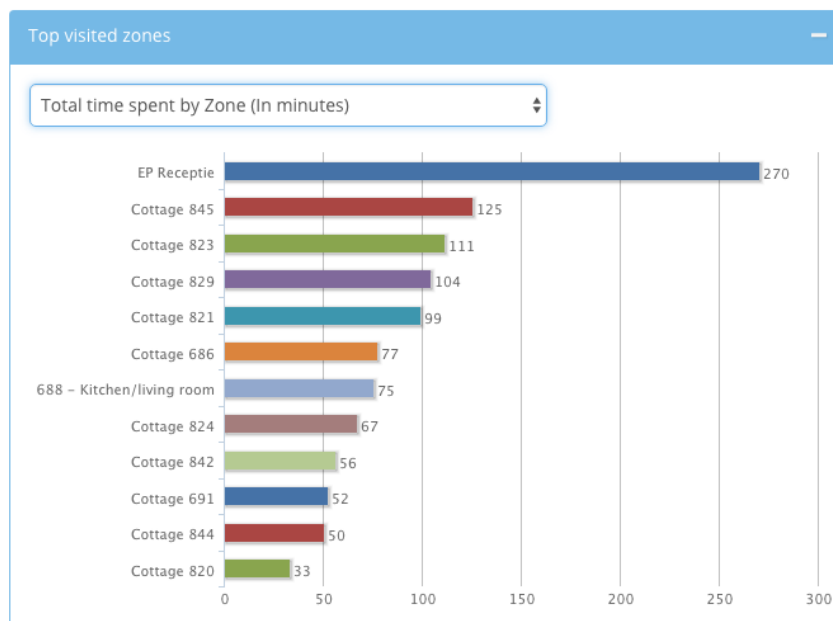Furthermore the system developed by SENS was integrated to offer better statistics reporting on the collected data.

Figure 5: Example of new statistics reported by the SENS system

4.3.   User training

No additional user training was needed. The mobile devices were used by the cleaning ladies in a similar way as in the first phase. The cleaning ladies explicitly stated that they did not want to be bothered during their cleaning activities so we were only collecting data for management purposes. Management however did get an overview of how to access the statistics generated by the system.

4.4.   Pilot monitoring and support

During the pilot the Floor manager made sure the cleaning ladies wore the bands and had the phone with them during the shift. IOS, INOV, SENS and YAZZOOM monitored the incoming data to make sure the system worked as expected. Only a few interventions were needed to deploy new beacons and update map locations of the new beacons.

5. Indoor pilot – phase2

5.1.   Initial setup

This section explains the initial setup for the second phase. Since there were no significant variation from the first phase, and has been deployed in the same location and the participants used the same sensors, we will briefly detail the most relevant aspects:

The equipment used:
- 5 Android smartphones
- 5 Microsoft Band II
- 2 temperature sensors
- 6 beacons for Indoor location

The modules tested:
- Cognitive module (new feature - Well-being questionnaire)
- Collaborative module
- Unique Access Module
- Active@work platform
- Skill development module (finished for the second phase)

At the beginning of the pilot, all participants were equipped with a smartphone and a Microsoft band and registered into the Unique user access module, in order to access the platform, display his/her data collected and interact with other active users.   For further information about the initial configuration of sensors, access and modules,   consult deliverable D5.2 and the User guide.

The indoor location sensors (beacons) and temperature sensors were placed in the same locations as the first phase - see the map below.
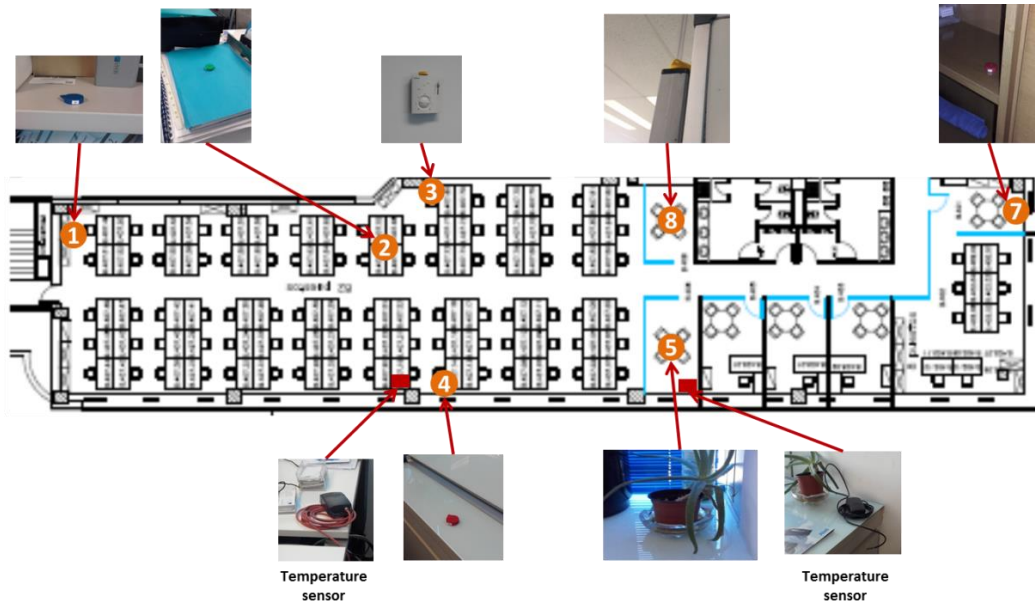
Figure 6: Indoor pilot sensors distribution

5.2.   Indoor Pilot timeline

The following table reflects the timeline of the second phase in further detail.

March 2017				
8	**9**	**10**	**11**	**12**
- Testing and setting up the communications in all bio sensors and the smartphones - All Microsoft bands works perfectly. - Testing the communication between the smartphones and the server - Testing the communication between the beacons and the server - Testing the unique access to the application	TRAINING SESSION DEMO SESSION			
13	**14**	**15**	**16**	**17**
Starting the Indoor pilot second phase - Starting	- 5 participants monitored from 9:00 am-14:00 pm - no significant	-2 participants monitored from 9:00 am-14:00 pm - the rest of the	- Beacons received and placed around the 4th floor. - Informed SENS	-2 participants monitored from 9:00 am-14:00 pm - the rest of the

monitoring from 9:00 am – 14:00 pm (5 participants) - Some issues in the smartphone app with Active 1 & Active 7 - Explanation of the wellbeing questionnaire to all users.	issues - Active1/active 7 reported issues related to the Login access at the server side.	participants just use the server side and answer the wellbeing questionnaire (teleworking)	about the sensors location - Temperature sensor placed in the 4th floor meeting rooms - 3 participants have been monitored, from 9:00 am-14:00 pm	participants just use the server side and answer the wellbeing questionnaire
20	**21**	**22**	**23**	**24**
HOLIDAY	- 4 participants monitored from 9:00 am – 14:00 pm - no significant issues	- 2participants monitored from 9:00 am – 14:00 pm - the rest of the participants just use the server side and answer the wellbeing questionnaire (teleworking) - Active 5 has and error in the smartphone app	- Active5 is working today. -Two sensors uncharged. - 3 participant monitored from 9:00 am – 14:00 pm - All of them are using the application at the server side - Active 3 reported an issue related to the skill development module	- Issue encountered in the questionnaire, included in the incident file for Active 1 user. - 2 participants monitored from 9:00 am – 14:00 pm - the rest of the participants just use the server side and answer the wellbeing questionnaire (teleworking)
27	**28**	**29**	**30**	**31**
- Technical survey questionnaire to all the participants. - 3 participants monitored from 9:00 am – 14:00 pm - The rest in a meeting - no significant issues - Active 3 give some suggestions related to the forum discussion and skill development module.	- 5 participants monitored from 9:00 am – 14:00 pm -no significant issues	- all participants have used the solution at the server side and wellbeing questionnaire - no sensors placed - Active 5 reported an issue with the Skill development module.	- 5 participants monitored from 9:00 am – 14:00 pm -no significant issues	- 1 sensor uncharged, no monitoring for that participant. - the rest of the participants just use the server side and answer the wellbeing questionnaire (teleworking)

April 2017				
3	**4**	**5**	**6**	**7**
- 4 participants monitored from 9:00 am – 14:00 pm - Active 1 found an issue in the skill development module, mentoring tool and cognitive module informed the contact point.	- Usability survey received and sent to all participants (first and second phase) - 5 participants monitored from 9:00 am – 14:00 pm - Active 3 informed to the contact point about an issue with the Forum discussion.	- 1 beacon missing, informed and sent the location again to SENS. -1 participant monitored from 9:00 am – 14:00 pm - the rest of the participants just use the server side and answer the wellbeing questionnaire (teleworking)	- 5 participants monitored from 9:00 am – 14:00 pm	**- Indoor pilot follow-up meeting** - 1 participant monitored from 9:00 am – 14:00 pm - the rest of the participants just use the server side and answer the wellbeing questionnaire (teleworking)
10	**11**	**12**	**13**	**14**
- 1 participant monitored from 9:00 am – 14:00 pm - The rest in Easter holidays	- 1 participant monitored from 9:00 am – 14:00 pm - The rest in Easter holidays	- 1 participant monitored from 9:00 am – 14:00 pm - The rest in Easter holidays	EASTER HOLIDAYS	EASTER HOLIDAYS
17	**18**	**19**	**20**	**21**
- Answers received from the participants of the two surveys provided. - 4 participants monitored from 9:00 am- 14:00 pm	- 4 participants monitored from 9:00 am- 14:00 pm - No significant issues - Active 5 reported suggestions related to the cognitive module	- 1 participant monitored from 9:00 am – 14:00 pm - the rest of the participants just use the server side and answer the wellbeing questionnaire (teleworking) - Another beacon missing.	- 4 participants monitored from 9:00 am- 14:00 pm - No significant issues	**End of the Indoor pilot Second phase**

5.3.   User training

The objective of this section is to describe the training process of the Indoor pilot in this second phase. The overall result of the training session has been to let the participants to understand the Active@Work functionalities in order to be able to use the solution during the pilot and to evaluate it afterwards.

The training session has been executed one day before the pilot starts with an audience of 5 participants and duration of two hours.

The materials that has been prepared and show during the training session are described below:

1. **Training presentation,** which covers the main aspects of Active@Work: what we expect from the users during the pilots, which equipment were going to be used and

how to use it, and finally a brief introduction about the main functionalities of the solution. (See annex I to see the full presentation).

2. **Demo presentation:** during the training presentation, a short demo has been shown, going through the features step by step in order to make sure that the participants understand the Active@Work solution and how to use it during the pilot.

3. **User guideline**; a complete user manual that includes all the functionalities of the Active@Work Solution. The new updated user manual will be provided as an Annex in this deliverable.

4. **Participant information sheet**; this document includes a short description and goals of the pilot, how we collect the data and what we expect from the participants. This document is described in deliverable D5.1.

5. **Informed consent form**; this document has been provided along with participant information sheet in order to comply with the ethical procedures. It has been dated and signed by each participant to be part of the pilot.

6. **Equipment for the participants;** During the training session, we have provided them with the devices to use during the pilot phase, (Microsoft band and a smartphone)

7. **Indoor Pilot incident template;** We have also talked about the support during the pilot, and we have provided them with an incident template (see section 5.4) and a point of contact that has offered help in resolving eventual issues in usage of the Active@work solution.

Figure 7: Training presentation

5.4.   Pilot monitoring and support

To properly manage the appearance of any error along the pilot, ATOS has defined two ways of reporting any bug detected:

1. **Incident template** file that has been provided to all participants at the beginning of the pilot, so they can send any errors or suggestions to the contact point for their solved. The figure below shows some of the information provided by the participants.

USER	DATE	MODULE	ERROR	SUGGESTIONS
active1	03-04-17	Cognitive module	Summer time is not updated	
active1	03-04-17	Mentoring module	The messages do not arrive instantly	
active1	03-04-17	Skill module	It shows information that is not mine and that I have not included	
active1	03-04-17	Skill module	It shows information that is not mine and that I have not included	
active1	03-04-17	Cognitive module		It would be useful to some type of notice when the connection is lost
active1	03-04-17	Skill module	Not possiblility of Degree only Degree in computer science areas. I'm Degree also but not in computer science areas	
active1	03-04-17	Skill module	Allergy list is incomplete	modulo Clinical profile
active1	03-04-17	Cognitive module		I think that list of measures would be more correct from the most current to the oldest
active3	04-04-17	Forum Discussion	I have erased one Idea without notice it.	the idea removed was not mine and it should not allow other user to remove it.
active3	23-03-17	Skill module	no filter by user, I can see the skills of others	
active3	27-03-17	Skill module		I see that I have 3 messages but I don't know how can I read them
active3	27-03-17	Forum Discussion		when I vote for an idea, it is not evident how can I save my vote
active3	27-03-17	Forum Discussion		In the forum discussion I can reply to myself
active3	27-03-17	Forum Discussion	If I click in ideas statistics nothing happens	
Active 5	29-03-17	Skill module	This user sees all the information from other users related to hard and soft skills	
Active 5	18-04-17	Cognitive module	The text received at the server side, related to provide stress coursers.	
Active 5	18-04-17	Cognitive module	The user has received just one alert in her mail message at the mobile phone, that does not match with the alert messages provided at the sever side.	
Active 5	18-04-17	Cognitive module	The users has expressed her concern relate to the number of alert messages received at the server side, in a very short time, she has received 38 alerts in a range of 10 minutes.	
Active 5	22-03-17	Login Access	The participant Active 5 has used the application from the beginning, but today could not connect to the mobile phone, the user is not present at the mobile app.	
Active 1 / Active 7	13-03-17	Login Access	Active 1 and Active 7 are missing in the Smartphone app	
Active 5	24-03-17	Cognitive module	Well-being Questionnaire not working properly	

Figure 8: Participant Incident template

2. A **shared excel file** for all technical partners, with the incident template information updated and checked on daily basis. In particular, each technical partner is responsible for identifying the issues he is responsible of and for providing a solution on those.

The reporting Excel file has the following fields:
- User: the participant who detected the issue
- Date: the date when the issue was found
- Updated by: the partner who add the issue.
- Modules: the name of the module involved at the pilot.
- Description: description of the behavior that generated the issue
- Responsible: partner responsible of the resolution.
- Resolution description: comment or possible solution of the technical partner who is in charge of fixing the issue
- Status: Resolution progress (in progress, not started, done)
- Deadline: a date when the issue should be finished.

The figure below show an example of this shared file. In order to facilitate the searching and the status of each errors or suggestions, a set of colours have been defined:

- Green for issues solved
- Yellow for those issues in Progress
- Red for urgent/ high priority issues
- White for issues not started.

User	Date	Updated by	Module	Description	Responsible	Resolution Description	Status	Deadline	Notes
All users	22-11-16	INOV (05.04.2017)	Indoor location	We can see the indoor location at the server side once we enter with supervisor role, but the beacons are not correctly indicated in the floor map, and you cannot see any user moving in the building.	IOS - Wim / SENS	Sending the map to Nuno today 23/11 INOV Sénior technical contact (**José Gonçalves, jose.goncalves@inov.pt**)	In progress (**High Priority**)	18/04/2017	Is not working the Indoor location at the server side apart from including the m... **[INOV]:** the data related to the localization of the indoor beacons is provided those beacons at the map as provided by IOS. Indoor movements of monitored people To see any user moving inside the building (e.g., people moving between rooms outdoor pilot at central park. Up-to-now what is being provided by IOS regarding to indoor people location is just this information it is not possible for INOV to show in the map where peopl monitored always correspond to the exact same coordinates of the beacon lo... **IOS** This is by design. Indoor location is limited to determining the closest bea now.
All users	14-11-16	ATOS INOV (05-04-2017)	Cognitive module – Server side	The heartrate does not distinguish between users at the server side	INOV – Gabriel / Nuno		Done	18/04/2017	The impact of this approach is to assure that when the user is logged in her/his measurements...this integration (i.e., filtering the data based on this week. Once we had the unique access implemented, the users will measurements, Skills and collaborative) **[INOV]:** It is not clear what is being reported because the values reported by a when a specific user logs into the systems it should see only the measurement VAT system based on the information passed by the OpenAM when the users INOV has performed some tests for the logged users but did not find any incon measurements that are related to another user
All users	23-11-16	ATOS	Cognitive module – Server side	Does logged in user only see measurements related to his/her profile?	INOV – Gabriel / Nuno		Done	12/04/2017	Each logged user should only see the values of the measurements related to h user then nothing is presented for each of the measurements (or sensors) liste
Active 7	01-12-2016	INOV (05.04.2017)	Cognitive module server side	The participant has suggested to reset everyday the steps, distance and calories at the server side	INOV – Gabriel/Nuno		Done	12/04/2017	This suggestions is not reasonable because the main goal is precisely to store record of the measurements (i.e. nº of steps in this case) performed by the user The user can even define if she/he wants to see the data at the most granular le is set to "day", but the user can select at the comobobox a different aggregatio The user has a set of features to filter or order the visualization of the measure performed in one day then she/he can do one of the following at the VAT works List mode: - Restrict the From/To date to just one day and select "day" at the Groupin Chart mode
Active 7	01-12-2016		Cognitive module server side	In the cognitive module at the server side, if you want to add a measurement, for example in weight it does not allow to save it.	INOV – Gabriel/Nuno		No started	18/04/2017	
All users	11-01-2017	Yazzoom	Skill module	Provide flag on courses related to 'wellbeing'	INOV		Done	05/04/2017	
User	29/03/2017	INOV (05.04.2017)	Localization module	The user indoor localization is not working properly, the application is not showing all the beacons	INOV / SENS		Urgent (High Priority)	10/04/2017	**[INOV]:** the data related to the localization of the indoor beacons is provided those beacons at the map as provided. The reported information is too generic, it would help if the user could indicate information enables the technical team to have some concrete data to check that is physically placed at a specific room and not showed at the map layout?

Figure 9: Shared excel file

5.5.   Madrid Workshop

The workshop has been held in ATOS premises in Madrid, the 25th April 2017, with participants from both phases of the Indoor Pilot and the entire consortium.

The objective of this workshop was to show the participants the results of the second phase and collect their impressions about the usefulness of the solution once the pilot has finished.   This event has also allowed the consortium compare the participant's feedback from both phases and analyses if the improvements made for the second phase has fulfilled their expectations.

The Structure of the workshop has mainly focused to discuss, generate and combine suggestions, problems found and solved, following the below agenda:

1. Welcome to the participants
2. Workshop objectives and agenda
3. Outdoor pilot presentation
4. Analysis of the Indoor pilot data
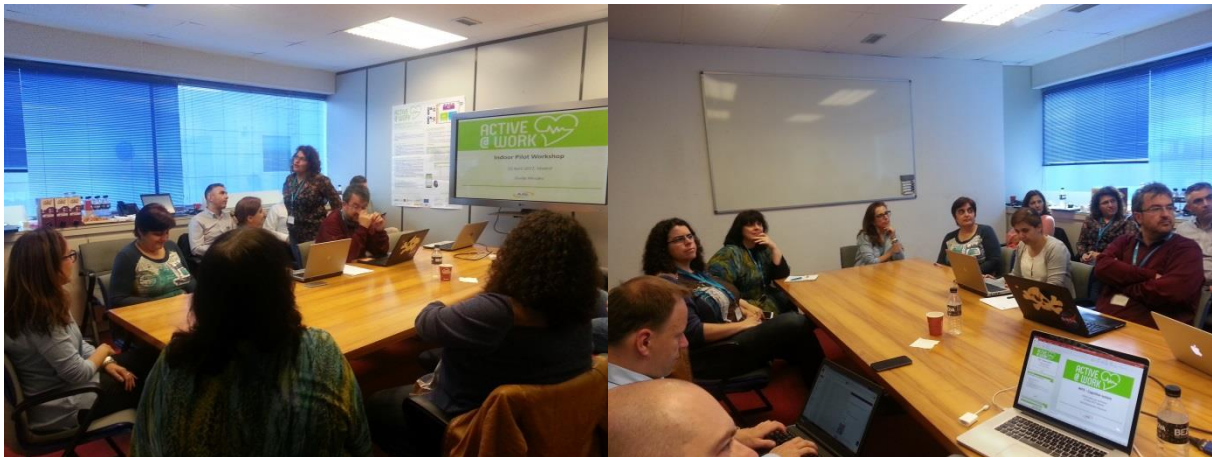5. Indoor pilot evaluation
6. Questions and Answers

Figure 10: Madrid workshop

6. Evaluation process

6.1. Technical Evaluation

The technical evaluation has been based on ensuring that:

- all requirements (functional and non-functional) are developed,
- everything works as a whole without failures,
- the integration between all modules is correct and
- Usability, ensuring the customer is satisfied with the system with.

Based on the above premises a small survey has been conducted at the Indoor pilot at the middle of the testing phase to have additional feedback from the participants, this survey has been an useful tool to provide significant findings of each module.

6.1.1. Indoor Pilot

6.1.1.1. Technical survey

Methodology

ATOS has carried out a short and simple survey in order to validate technical and functional aspects of the solution during the pilot phase. This survey pretends to be easy to fill up (Keeping it simple, very visual, key questions, etc.) and all modules are included into it.

This approach gave us time to collect and analyze active user's suggestions and impressions and improve our design. The figures below show the questions asked to the participants.
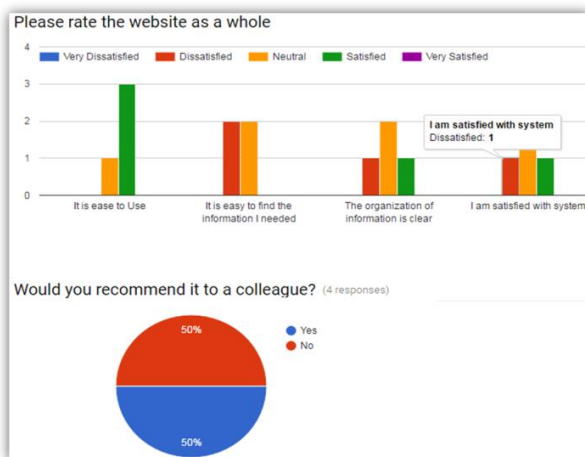
Figure 11: Main interface of Active platform

Figure 12: Skill module survey

Figure 13: Collaborative module survey.

Figure 14: Mentoring tool survey

Result

From the technical point of view, this survey has been very useful to improve the modules before the pilot ended. Based on the received answers, we have learned that the participants experienced difficulties to find the information needed and the information was not well distributed throughout the user interfaces.

See the results in the figures below.

Figure 15: Main interface of Active platform results

Figure 16: Skill module results.
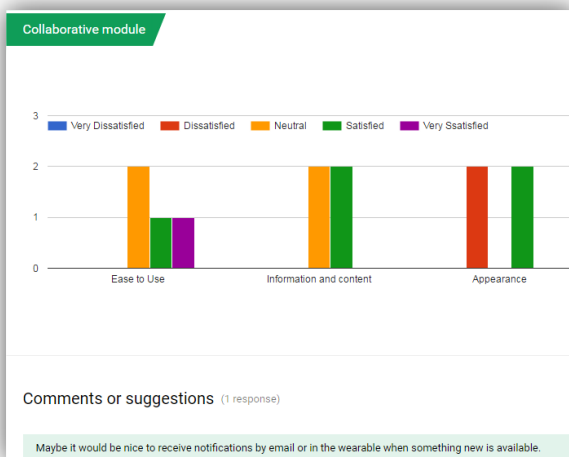
Figure 17: Collaborative module results
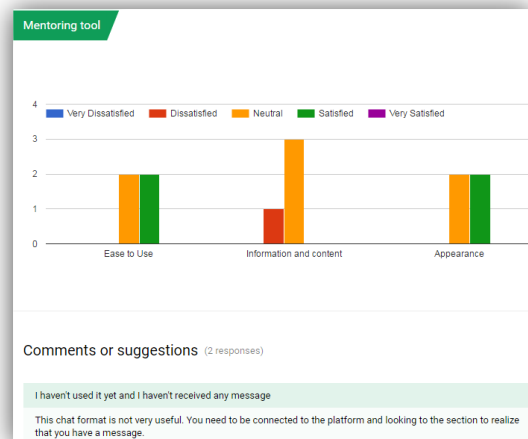
Figure 18: Mentoring tool results

The section 6.2 will analyze the most important aspects that have been detected related to usability and user satisfaction.

6.1.1.2. Stress detection and notifications

During the second phase of the indoor pilot, the cognitive module was configured to detect signs of stress and to notify the user. The stress detection was based on measurements gathered by the MS Band, namely the heart rate and movement (as measured by the accelerometer and gyroscope in the band). Situations of stress were detected as moments when the user has a combination of an unusually high heart rate but no corresponding high activity level (to avoid false alarms in cases where the user is moving around). Important to note here is that the baseline heart rate and activity levels were learned rather than set or programmed, as such the stress detection is person-dependent and adapts to any changes in e.g. baseline physical condition.

The stress detection generated notifications which were displayed on the Active@Work VAT and which could be marked as read. Additionally, a mail was sent containing a cautious message saying that the cognitive system has detected a heart rate level that is abnormally high – which could be indicative of stress.

In addition, a survey was compiled which the users were asked to fill in at the end of every work day. Among other questions, the users were asked when they felt most stressed during the day. There were insufficient survey responses to correlate stress notifications from the cognitive module and self-reported stress moments for each individual user, but the figure below shows that over the whole pilot period and all users, the times of the stress notifications correlate nicely with the self-reported times of high stress loads.
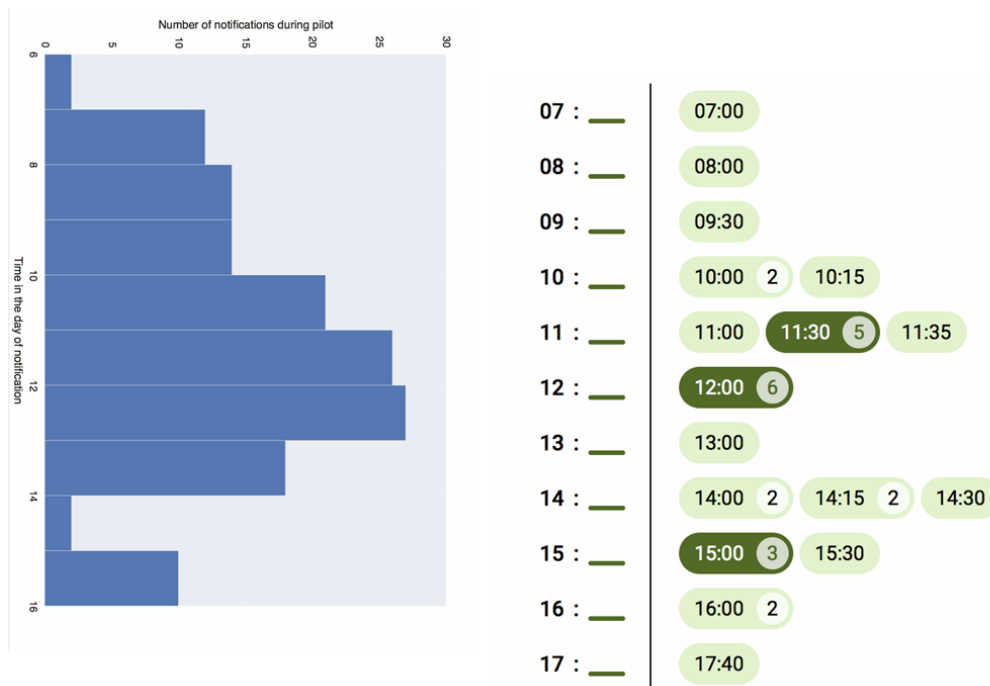

Figure 19: Stress and notification analysis

6.1.2. Outdoor Pilot

In the outdoor pilot the combination of heart rate and activity was used to determine stress. The mobile application was extended to collect fine grained activity levels through the MS Band's accelerometer.

By combining location and activity (measured via the average acceleration of the band, as an indicator for the level of intensity of movement) we were able to produce activity levels for each cottage. Activity level is measured through the accelerometer in the MS Band, which also measures the (constant) acceleration caused by gravitation, and which is equal to 1 (since the accelerometer measurements are expressed in units of g, the gravitational constant). We therefore use the absolute difference between the accelerometer measurement and the value 1 (which is measured when the band is held still), times 10 to yield not too small values.

The location and activity values are reported from the mobile device to the server and processed by the cognitive module. The result is an overview of the level of activity per cottage and cottage type and the level of stress per cottage and cottage type.
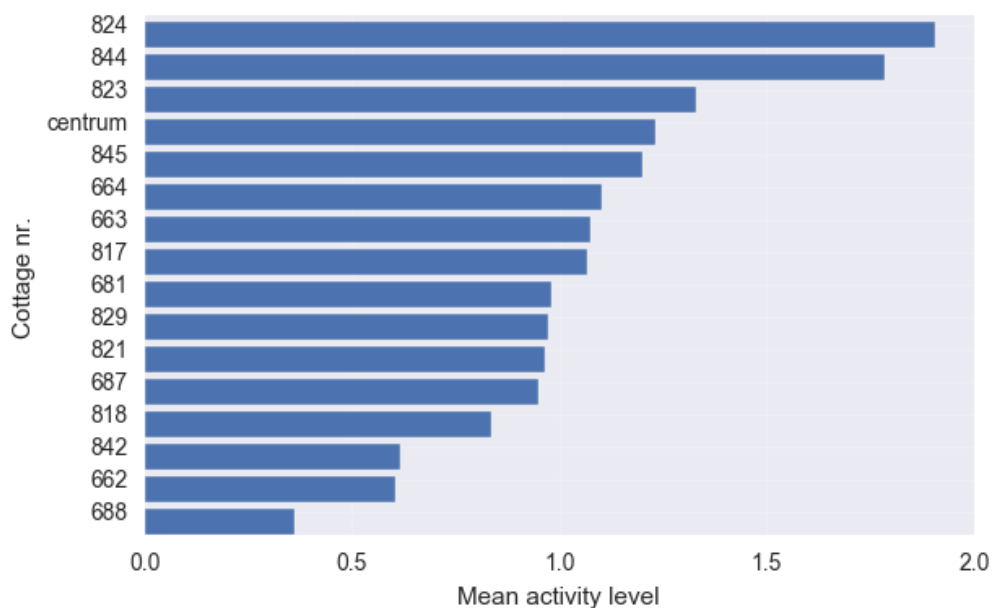

Figure 20: Activity level per cottage

6.2. User satisfaction

6.2.1. Indoor Pilot

6.2.1.1. Methodology

With the user evaluation at the end of second phase of indoor pilot at ATOS we had one major goal, to get user's feedback on usability, ease of use, the system's impact and their satisfaction. Through users' feedback on their actual experience with Active@Work, we tried to assess if there were any aspects that we did not considered in Active@Work design. Therefore, in order to go hand in hand with the development, in addition to providing a questionnaire to the end users, we conducted a

focus group with end users as well as all the technical partners as part of Indoor pilot workshop in Madrid in April 2017. In this focus group, we presented the quantitative results of end users' feedback based on the data gathered by the questionnaire. We asked them for their qualitative feedback on their experience on each factor we asked in the questionnaire. In this setting, the end users could openly discuss and share their concerns with Active@Work designers. The main factors we asked were the following: system output, system interaction, user interface, training and support the users received during the pilot, individual impacts and finally the user satisfaction.
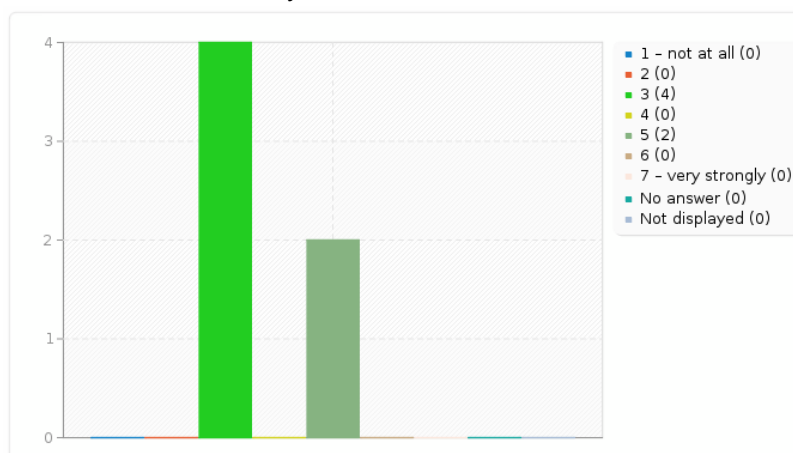
6.2.1.2. Results

System output

Accuracy: Active@work provides the precise information I need.
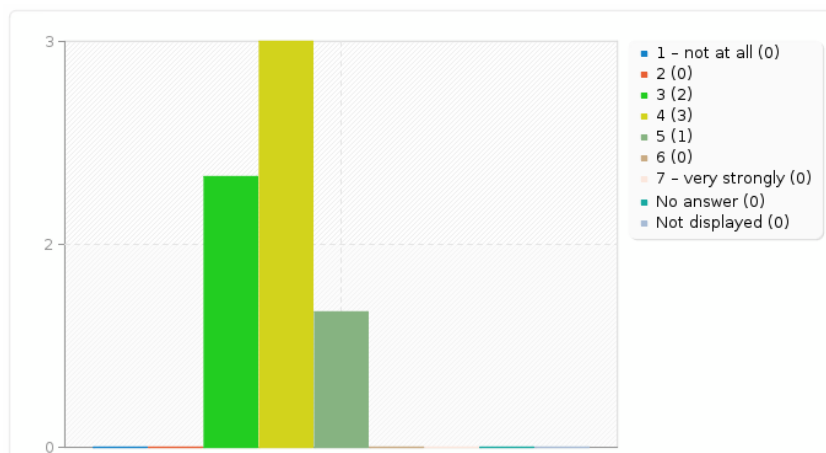
Accuracy: I am satisfied with the accuracy of Active@work.

In general, the users were satisfied with the accuracy of the information they received on Active@Work. However, they had some concerns. One of the users mentioned that sometimes they forget to charge the band; when they charge it and turn it on they have to set the date to the correct date. Therefore, they were concern if they make a mistake on setting the date on the band, they would mess with the system and the accuracy of the information they receive would decrease. In this regard, one of the system designers clarified that it is not the case, because the date on the

system is an internal measurement and it is not aligned with the date on the band, so there is no problem if the user make a mistake.

The other concern was that when the users lose the WIFI connection and they do not realize it the system would lose their data during the time that they are not connected. One user proposed to receive an alert when the connection is lost. In response to this concern, one of the system designers mentioned that sending the alerts each time users lose the connection would be annoying; therefore, the solution that is covered by the system is to buffer data on the smartphone while the user does not have internet connection.

Content: Active@work provides reports that seem to be about exactly what I need.
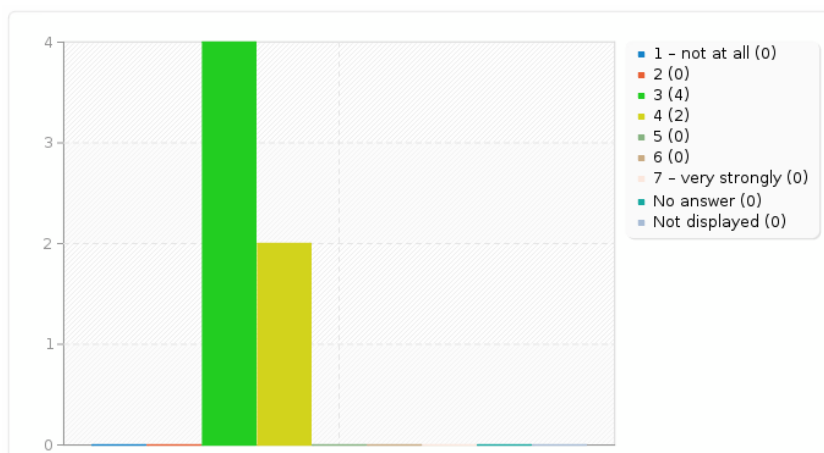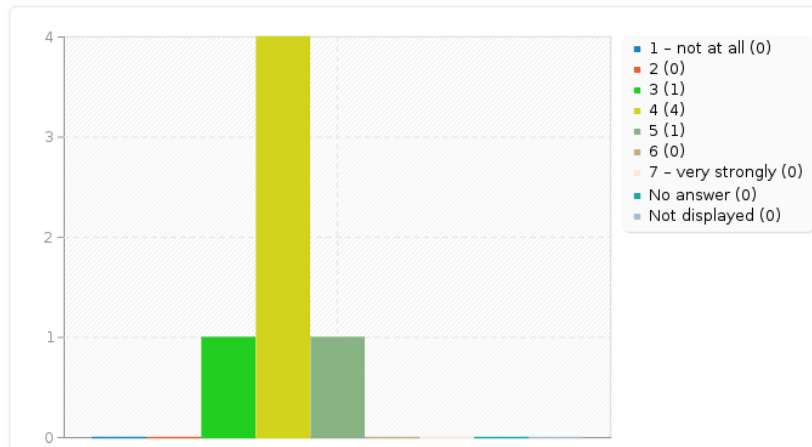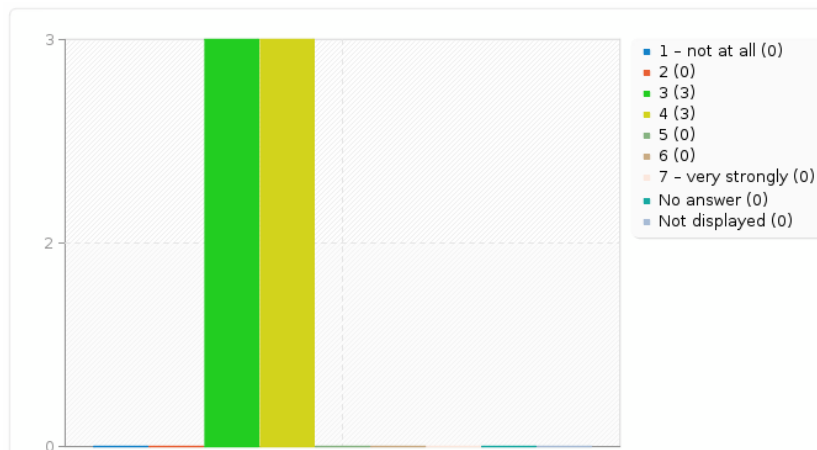

Content: Active@work provides sufficient information.
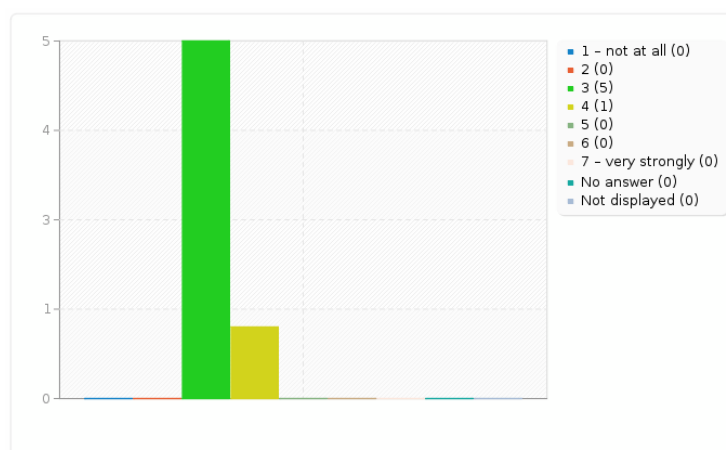
Timeliness: I get the information I need in time.

Timeliness: I have to spend too much time correcting things with this system (efficiency).

Timeliness: The system provides up-to-date information.

Regarding the timeliness, the main concern of the users was that they needed to log in to the system, each time they wanted to check if there is a comment on their idea on collaburative module

or something like that. The users expected to receive a notification, whenever there is a piece of information relevant to them. Since part of the development was still ongoing so some of the comments the users made was already implemented at the time of the workshop but was not available at the time of second pilot at atos. Thus, the designers commented that while this concern was valid and important, it was already implemented in the system.

Ease-of-use: Active@work is user friendly.
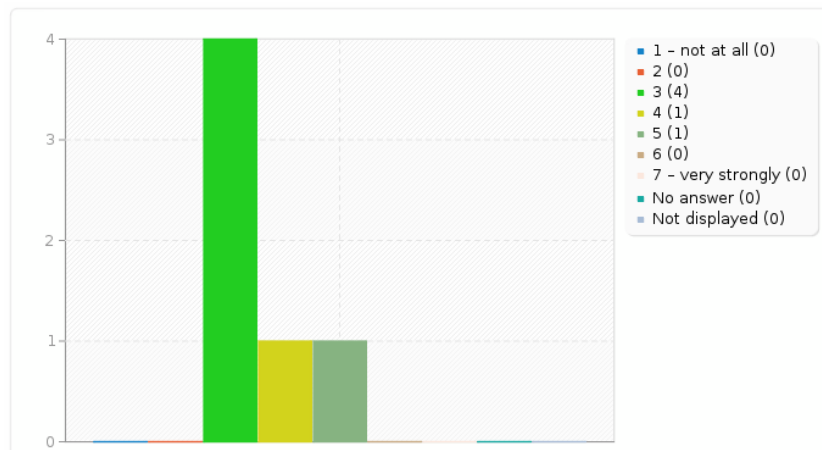
Ease-of-use: Active@work is easy to use.
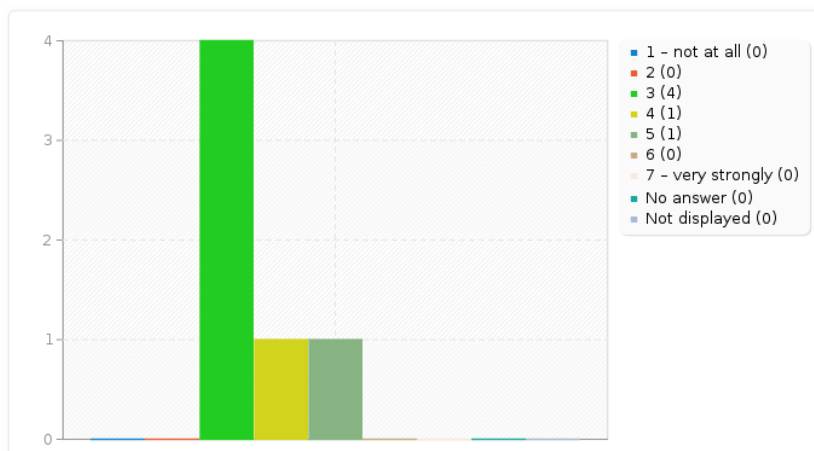
Similar to the timeliness, the comments the users made were implemented in the system in current version of the prototype. For instance, users expected more graphical representation, which they believed it could improve the ease of use of the system by making it more interactive.

Format: I think the output is presented in a useful format.
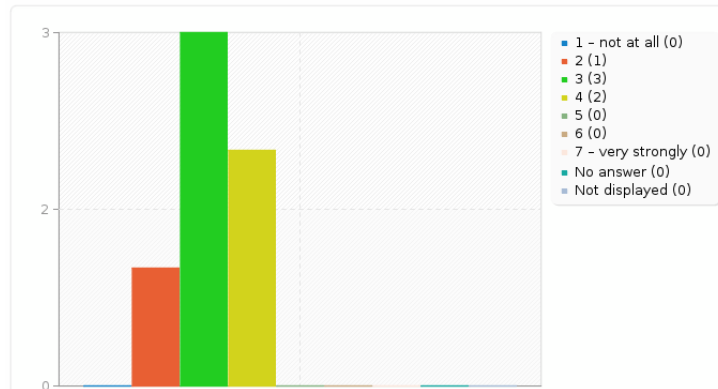
Format: The information is presented in a clear format.
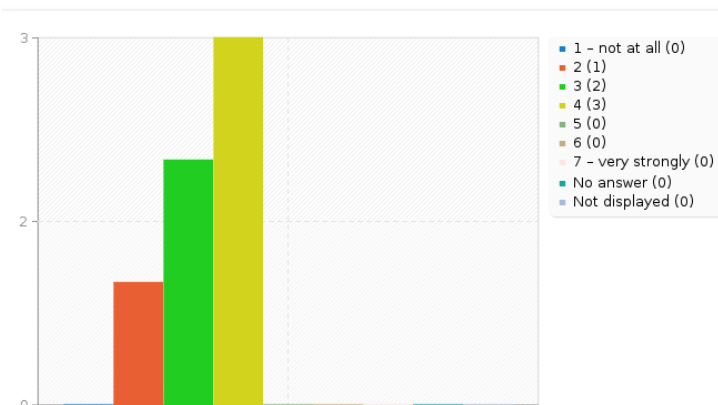
The feedback on the format was similar to the ease of use feedback. Users expected more graphical representation, which is already implemented but was not available to the users during the ATOS pilot.

Interaction
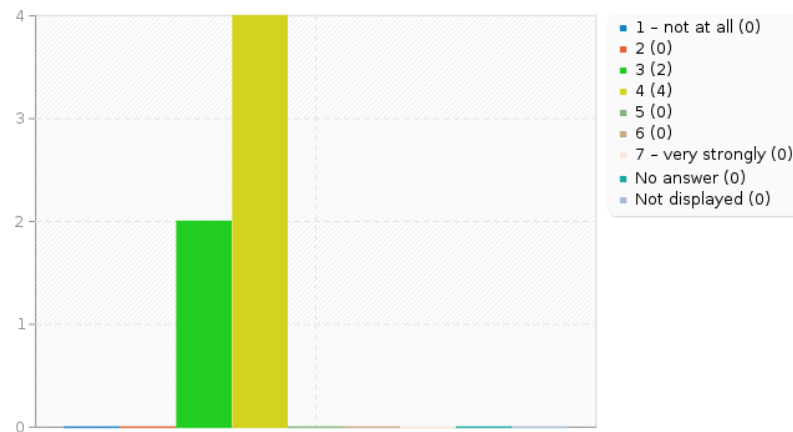
The Active@work feedback (recommendations) is helpful.
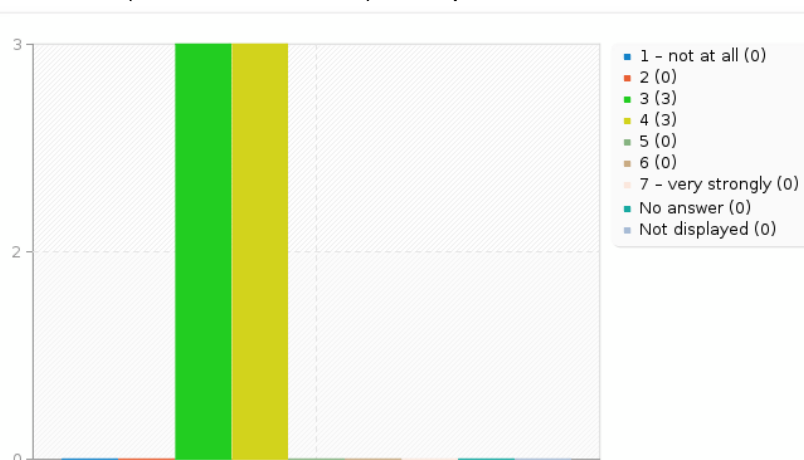
lThe Active@work feedback (alerts) is helpful.
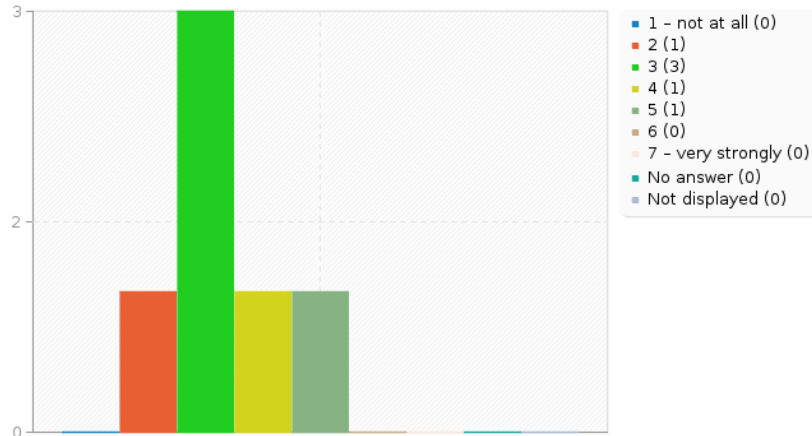
The system's response to errors is helpful.

The users expected to receive the recommendation on their smartphone. This feature was also implemented and covered in the current version of the system.

Constant connection and interaction with this systems increase my stress at work.
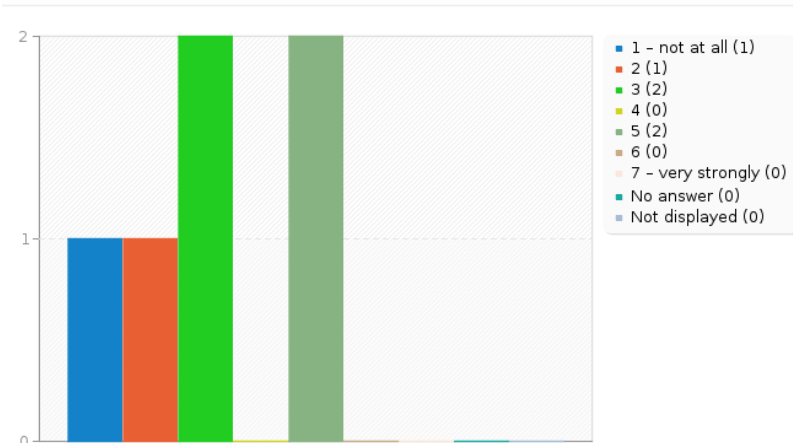
The interaction with this system interrupts my work.
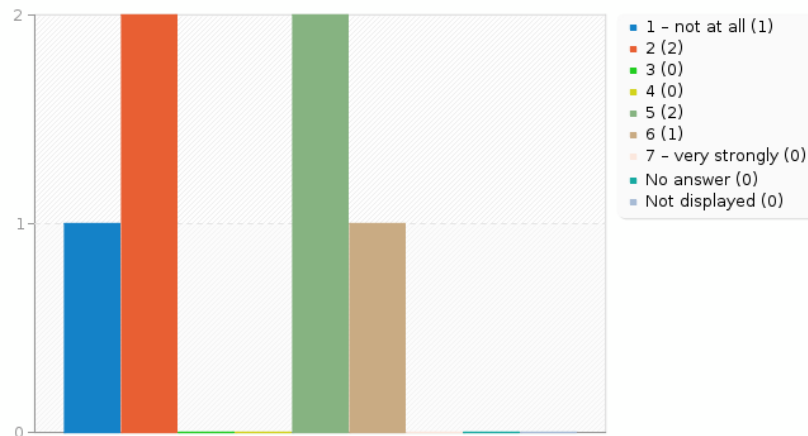
The interactions with system distract me while I am working.
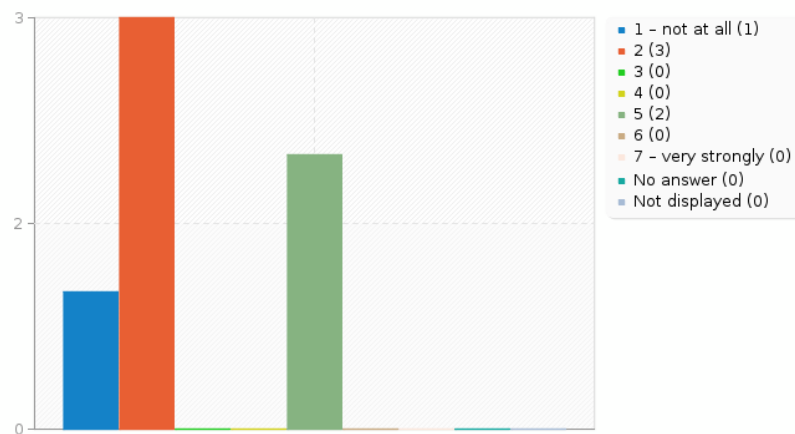
One of the users commented that she expected that Active@Work would be more disturbing and somehow annoying which was not at all the case. As it was mentioned above, they expected to receive more alerts and recommendations.

User Interface

Reading the characters on the screen is easy.
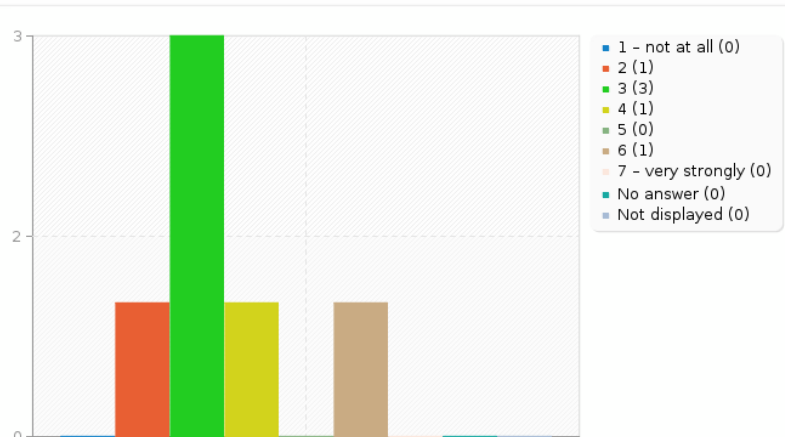
The organization of information is clear.
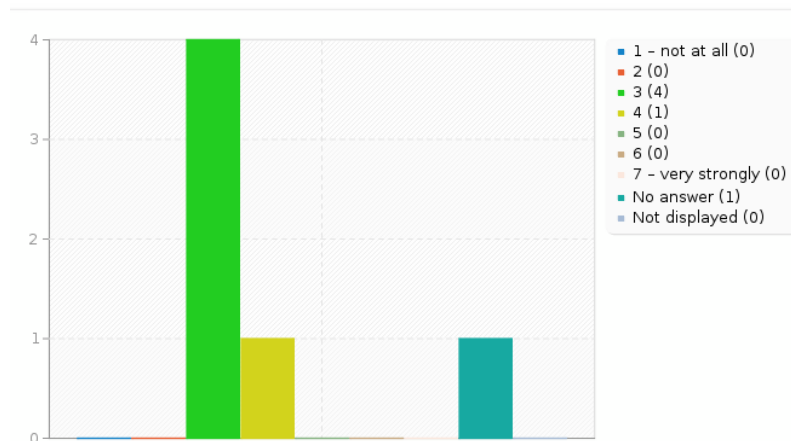
Sequence of screens is clear.
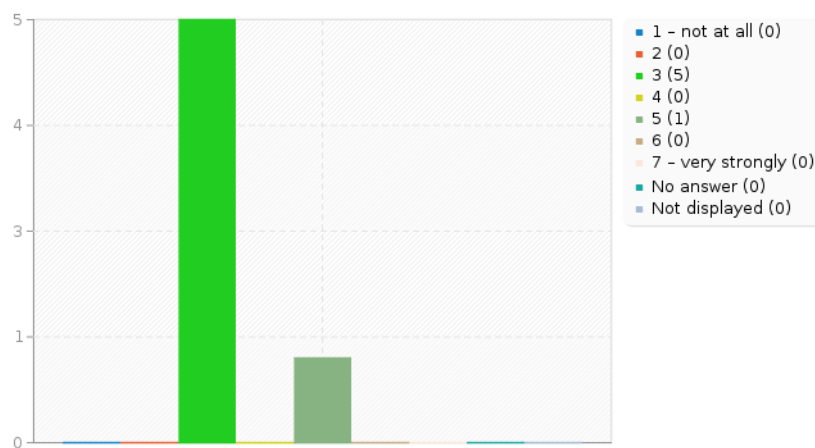
The Use of colors and sounds is good.
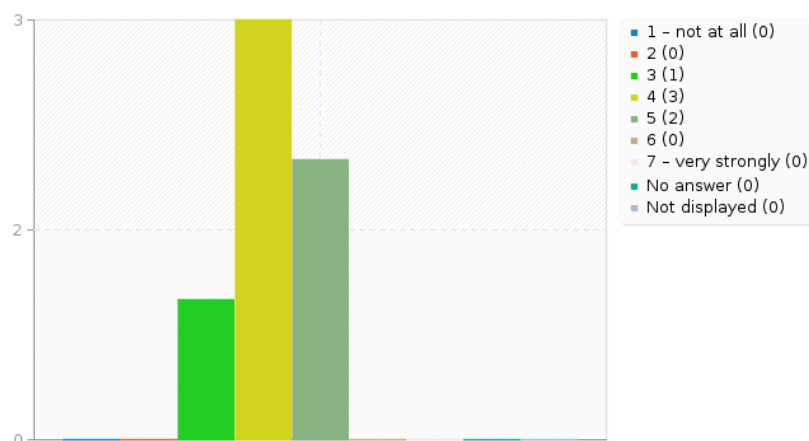
While the users were mainly satisfied with the interface, as it was mentioned already, they expected more graphical representation.

Training and Support

The training and support provided before and during system's usage was required.
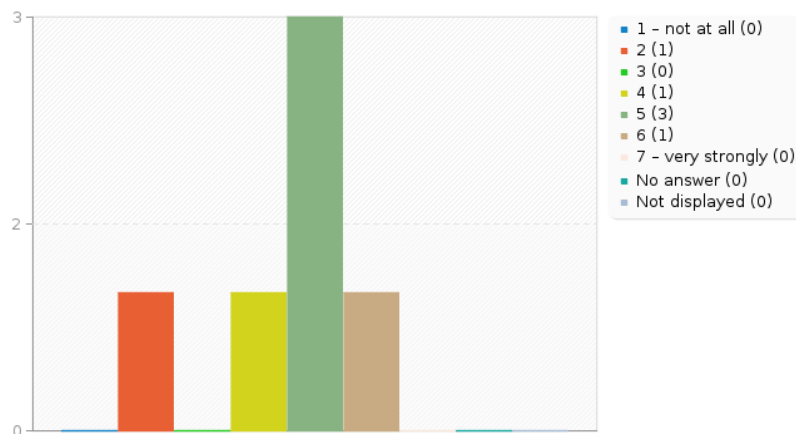
The training and support provided before and during system's usage was helpful.
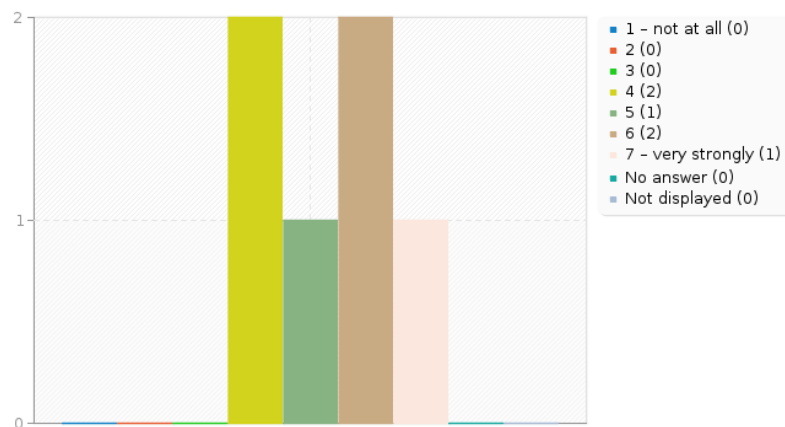
Regarding the training and support, they were so positive about it. However, they mentioned that it could improve their experience if the system could provide them with quick tips when they were using the systems. This comment is also implemented in the current version of Active@Work.

Individual Impacts

Overall, I feel continues use of the system would improve my physical health.
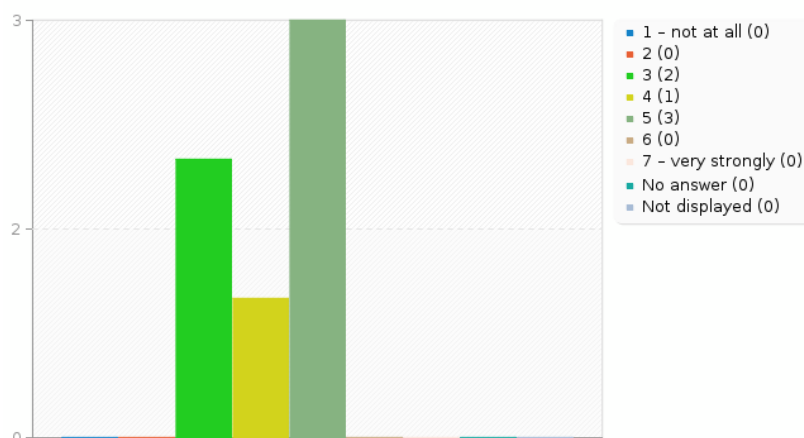
Overall, I feel continuous use of the system would improve my security and helps me to prevent accidents and injuries at work.
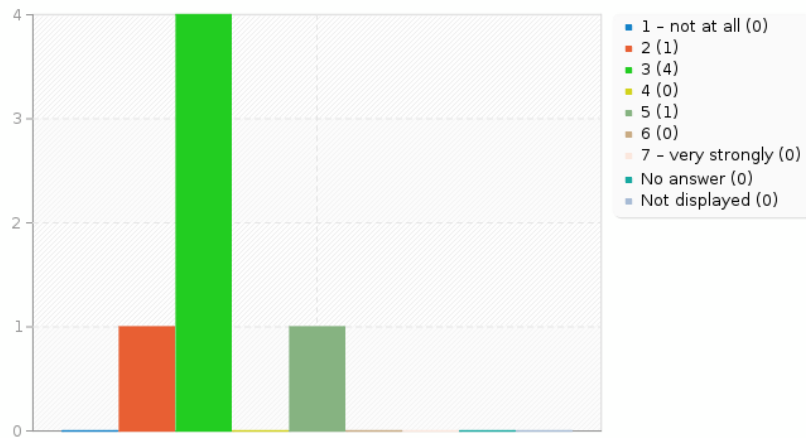
Overall, I feel continuous use of the system would influence my level of satisfaction and happiness at work.
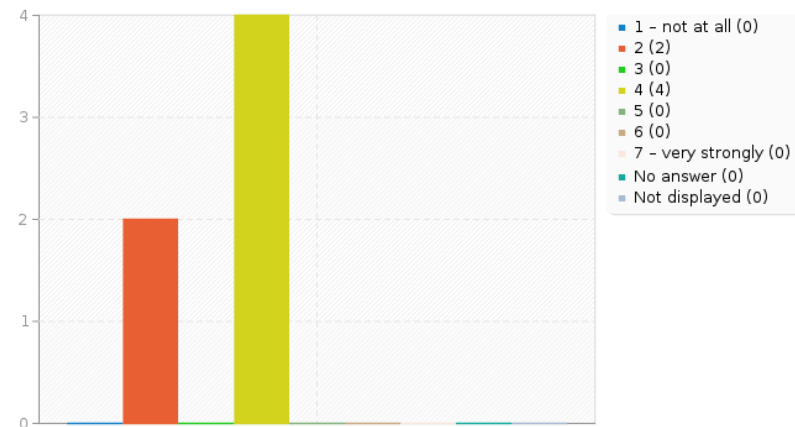
Overall, I feel continuous use of the system would influence the quality of my relationship with my colleagues.
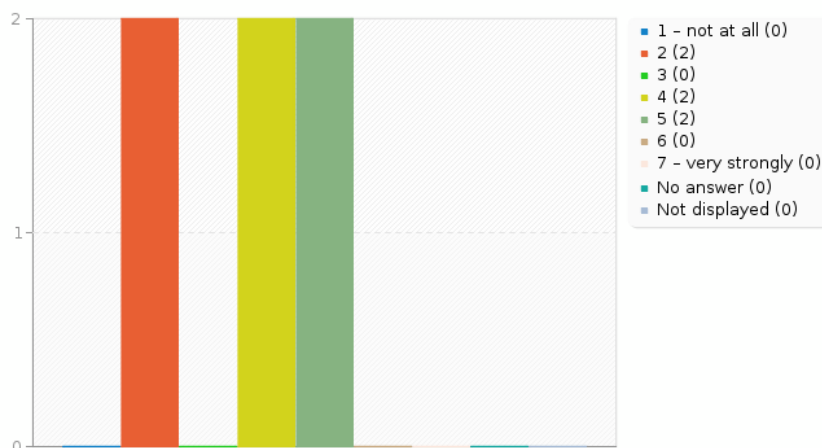
Overall, I feel the system would improve my performance at work.
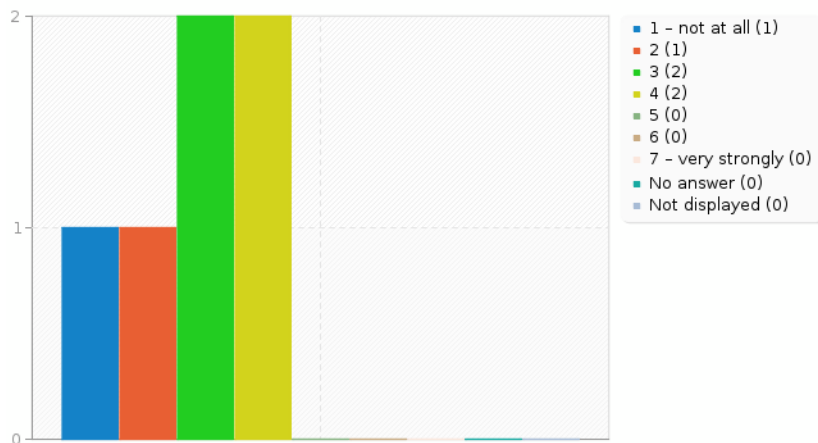
Regarding the impact, they were positive about it. They could foresee that continuous use of the system could improve their wellbeing and performance if the main concerns that they had were addressed in the system.

User Satisfaction

Overall, I am satisfied with using Active@work.
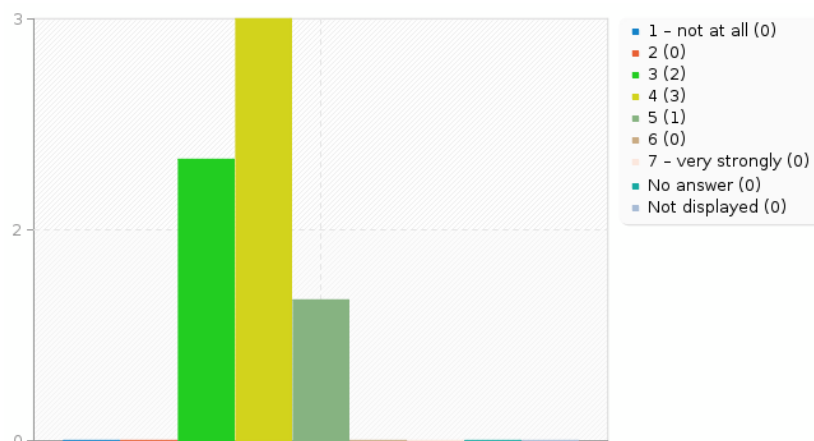
I would like to continue using the system.
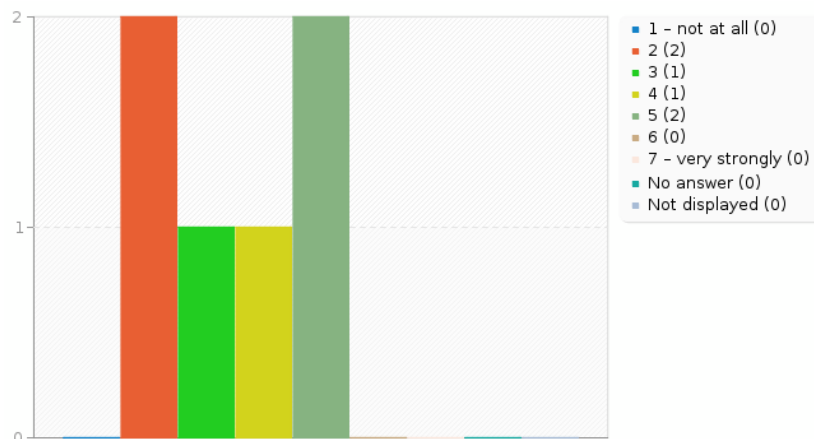
While users had some concerns that were presented in this section, overall they were positive and satisfied with the system. For the case of ATOS, they mentioned that Active@Work has to compete with the platforms that are already stablished and employees are used to them. However, they also mentioned that the added value of Active@Work in comparison to those platforms is to give the user a tool that could cover all the aspects of social, physical and mental wellbeing in one consistent package.

6.2.2. Outdoor Pilot

As the interaction of the cleaning ladies with the system is very limited (wearing the band and mobile device) we opted for an interview with management to determine what the user satisfaction was of the system. The cleaning ladies themselves were not hindered by the system at all.

The main goal for Centerparcs to join the pilot was to better understand the working conditions and what causes stress for the cleaning ladies. In the end the better understanding would enable management to improve the working conditions for the cleaning staff.

The current system offers management insights on time management, activity level and stress level for all cleaning staff that joined the test. Given the short testing period it is too early to draw conclusions but already some very interesting results have been found. We refer to deliverable D4.06 that further explains in detail what questions were answered during the outdoor pilot and how the Centerpacs management was able to answer these questions from the results produced by the active at work system.

The best indication that the system is indeed deemed useful is the request from Centerparcs to keep using the system for the coming months. All partners agreed on this and allowed Centerparcs to keep using the system and hardware for a few more months.

7. Overall pilot Indicators

The key performance indicators accompany the pilot evaluation methods and enable to assess the success of the evaluation phase and the impact the Active@work system during the pilot phase. The table below lists the KPIs that have been proposed during the project lifetime.

Module	Indicators	Target	Achieved	Reason
Data Communication Gateway	Number of end-users for data collection	10	Y	
	Number of end-users for indoor location	15	Y	
Data Integration Gateway	Number of Bio-parameters collected and integrated	5	3	Steps, heart rate, body tempereature
	Number of location-dependent variables (air quality, thermal comfort, luminosity comfort and noise comfort)	4	Y	

OLTP Database	Number of key performance and risk indicators to support operational intelligence of the system	6		
Cognitive module	Number of data analytic techniques for deriving patient behavior or early detecting health risks	2	2	
	Number of alert messages related to the health status and wellness of the monitored individual	6	2	Additional alert messages were not considered useful, to not overload the user with messages
	Number of alert messages to be provided, related to the comfort level at the workplace	4	1	Additional alert messages were not considered useful, to not overload the user with messages
Collaborative module	Number of web-serviced developed for data interoperability using REST architectural style	6	0	For data interoperability into Collaborative module has used WebSockets protocols (Get unread messages, mark read messages, stablish communication between users, etc.).
	Number of services for interaction with the end-user (knowledge Share, Consulting Services, Tutorial Services and Ideas Farm)	4	3	In Mentoring tool and/or forum discussion users may share/send any kind of information (free text, links, etc).
devices	Types of mobile devices to install the solution	3	2	
Pilot 1 (ATOS)	Number of end-users involved	10	Y	
Pilot 2 (IOS)	Number of end-users involved	15	Y	

The answer of the table below was based on the feedback we got during the user workshop in Madrid and the questionnaires to the end-users.

kPI Name	Description	Target Value	Achieved
Number of end-users involved in the pilots	Pilot 1 will involve senior workers from 43 to 55 and the Pilot 2 will include employees working in cleaning, maintenance and security of the leisure park.	25	Y
Number of users with positive feedback	Positive feedback of the users about the usability and understand ability of the pilot applications (to be asked in the Pilot evaluation questionnaire).	20	N

Usefulness of the data provided	How the user evaluates the data provided. A qualitative subjective approach in a scale of 1-5 (with 5 to be the max, to be asked in the Pilot evaluation questionnaire).	4	4
Ease of use of the final system	How the user evaluates the ease of use of the final system. A qualitative approach in a scale of 1-5 (with 5 to be the max, to be asked in the Pilot evaluation questionnaire).	4	3
Bio-Sensors usability	The level at which a device can assist the end-user without interfering with his/her normal activities of daily living. A qualitative approach in a scale of 1-5 (with 5 to be the max, to be asked in the Pilot evaluation questionnaire).	4	4
Privacy Protection	Preserve the privacy of user data and ensure the trustworthy and secure transmission of user data to the applications. Always anonymise user data before transmission. Positive feedback of the users about the security of the pilot applications (to be asked in the Pilot evaluation questionnaire).	Percentage of the correct evaluation: 100%	5
Training Satisfaction	Level of satisfaction of training end-users to understand the system. A qualitative approach in a scale of 1-5 (with 5 to be the max).	4	4
Smartphone Energy efficiency	Maximum runtime of a smartphone running the application and sending data before the battery depletes.	Loss of battery % per operational hour	15% per hour
Number of users registered to the Active@work dashboard	Number of user registered in the application during the Pilot phase, including administrators, end-users, etc.	>25	Y

8. Conclusion

This section will be focused on the lessons learned generated by both pilots , along the project lifetime, the pilot has faced many challenges and, in the process, has created a useful knowledge base of lessons learned that it is described below:

8.1. Indoor Pilot Lesson Learned

- **Technical aspects:**
  - **Integration among components:** From the very beginning the consortium have taken into account the requirements gathered from different users, therefore the usability aspects have been played a major concern before starting the development. The Active@work integration has tried to cover both functional and non-functional aspects and has been obtained from the continuous and direct

interaction between the technical coordinator , technical partners and the pilot leader as well as from the feedback obtained from participants.

- o **Interoperability between systems**: The main challenge has been to achieve a successful integration by linking a series of modules (Collaborative, Skills, Cognitive, etc.) produced by different technical partners (ATOS Spain, INOV INESC INOVACAO, YAZZOOM and IOS International). The technical partners involved have built a customized architecture to combine different modules within Active@Work platform. This integration has included project planning and management, specify a common design of interfaces as well as a two-way communication to exchange information between modules, for example, WebSockets and Geojson ; WebSockets in Cognitive module is used to send alerts to the VAT and in Mentoring tool to send unread messages to VAT and mark them as read (once the user clicks on it). Geojson is used to upload into VAT map-based layout (e.g., point geomarkers signing the location of the reported occurrence). In addition, all technical partners had made a massive effort to increase their collaboration, communication, and relationships and consequently the software product
- o **Implementation challenges:** The implementation of the pilots has been a challenge since two different environment and locations have been applied. ; Indoor pilot (Madrid in a four floors building) and outdoor pilot (Leisure Park located in Belgium). This approach have covered two heterogeneous organizational processes, including requirements for both environments which has implied to consider parameters end-user needs from multiple perspectives, concerns and operational requirements.
- o **Cognitive Module;** related to this module the lessons learnt have been the following: (1) the step count and calorie measurements are not suitable for deriving the physical activity of the user. (2) It would be useful to provide notifications to the user via the band instead of via the VAT or via mail, since the notifications are most useful if the user receives them at the precise time he/her experiences stress. (3) It seems to be possible to derive useful stress notifications from the combination of heart rate measurements and user activity measured through the accelerometers on the band.
- o **Equipment:** The Microsoft bands run out of battery each six hours with no further notification, so the challenge was to maintain the battery running every day during the testing phase.

- **Testing process:** The main lesson learned was the relation with the participants, there is a need of having a contact point in order to facilitate and speed up the improvements and suggestion received. This point of contact and the incident share file have been a quick tool in order to fix any issue detected.
- **Training required**: The training session at the indoor pilot were a great value , user manuals and presentations were provided. The participants showed a great enthusiasm about the modules and provided valuable feedback before the pilot starts.
- **The participants have been crucial for the project:** There have been a survey questionnaires launched at an early stage of the project that was a good starting point to know where we were and where the users thought we were going. During the pilots and after the pilot phases, a set of surveys have been provided in order to improve the solution.

8.2.   Outdoor pilot Lesson Learned

Many of the technical lessons learned are similar to the ones stated above for the indoor pilot. We will focus on the lessons learned specifically for the outdoor pilot.

- **Sensors:** not all devices are created equal and sensors advertised as a unique sensor are often a virtual combination of other more basic sensors. The results obtained from these sensors are very unreliable and at best an approximation of the real values. We have found the sensor values reported by the MS Band 2 for calories burned, steps and stairs climbed are unusable for stress detection. They are derived from the accelerometer values but the result is very unreliable.
- **Location:** Combining location and activity (or any other value) offers very interesting opportunities for visualizing the data. Far more interesting and intuitive then charts are values plotted onto maps.
- **iBeacons**: were very easy to work with and the results are easy to interprete. Whereas GPS location offers a lot of detail (like paths and speed) sometimes a single location beacon can offer very clear and easy to interpret information.

9. Annex I: Training Presentation (slides)

ACTIVE @ WORK

FASES PILOTOS

PILOT TIMELINE

	2016								2017			
Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
M17	M18	M19	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29	M30

Outdoor Pilot - TEST

Outdoor Pilot - 1st phase
Starting date (12/09/2016)
Duration 1M - 7 participants

Indoor Pilot - TEST

Outdoor Pilot - 2nd phase
Starting Date (05/04/2017)
Duration: 1M - 8 users

Indoor Pilot - 1st phase
Starting date (24/10/2016)
Duration: 1M - 5 participants

Indoor Pilot - 2nd phase
Starting Date (13/03/2017)
Duration 1M - 5 users

Evaluation 1st Phase (data collection and analysis)

Evaluation 2nd Phase (data collection and analysis)

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ACTIVE @ WORK

PILOTO EN ATOS – DATOS UTILES

FECHA DE INICIO: 13/03/2017
FECHA FINAL: 07 /04/2017
PARTICIPANTES: 6

A TENER EN CUENTA

1.- LAS PRUEBAS SE REALIZARAN DURANTE 6 HORAS (9:00 – 14:00)

2.- LUNES A VIERNES

3.- LOS DIAS DE TELETRABAJO SE UTILIZARÁ SOLO LA PARTE DEL SERVIDOR

4.- CADA PARTICIPANTE ES RESPONSABLE DE CARGAR EL SMARTPHONE Y EL SENSOR QUE DEBE SER CARGADO DIARIAMENTE, EL SENSOR TIENE UNA AUTONOMIA DE 6 HORAS APROX.

5/4/2017 — 7

ACTIVE @ WORK

PILOTO EN ATOS – ASIGNACION USUARIOS

➤ A cada participante se le asignará un usuario:
- **ACTIVE 1**
- **ACTIVE 2**
- **ACTIVE 3**
- **ACTIVE 5**
- **ACTIVE 7**
- **ACTIVE 8**

➤ Este usuario será el mismo para el smartphone y para el servidor.
➤ No es necesario la contraseña para entrar al Smartphone, pero si al servidor.
➤ La contraseña por defecto para todos es: 12345678
➤ Puede cambiar la contraseña el participante

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ACTIVE @ WORK

PILOTO EN ATOS – MATERIAL A UTILIZAR

- **Smartphone:** Incluye un app que se conectará con el servidor y tu sensor de muñeca
- recibirás información de tu ritmo cardiaco, temperatura corporal y pasos.
- recibirás alertas y recomendaciones si tu ritmo cardiaco es elevado.

- **Microsoft band:** Monitorizará el ritmos cardiaco, temperatura corporal y pasos realizados durante la medición.

- **Sensor medioambiental:** monitorizará la temperatura de la zona de trabajo, humedad, ruido y luminosidad

- **Beacons:** ver el posicionamiento de cada usuario en cualquier momento

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ACTIVE @ WORK

PROCEDIMIENTO DIARIO - SMARTPHONE

1. Encienda el Smartphone presionando la tecla de encendido situada a la derecha por 3 segundos.
2. Abrir la aplicación del móvil.

Active@Work

3. En las siguiente pantalla presionar conectar y elegir el usuario que se os ha asignado

USUARIO

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ACTIVE @ WORK

PROCEDIMIENTO DIARIO - SMARTPHONE

4. Después de elegir tu usuario, aparece la siguiente pantalla donde tienes que activar la configuración de ubicación y datos biométricos con el botón ACCEPT

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ACTIVE @ WORK

PROCEDIMIENTO DIARIO – MICROSOFT BAND

1. Poneros la Banda en la muñeca, tiene que estar firmemente sujeta, si está muy suelta puede que no recoja vuestros datos biométricos adecuadamente

2. Encender o apagar la pantalla, manteniendo pulsado el botón de encendido durante 5 segundo.

3. Una vez encendido, ya empieza a transmitir al smartphone vuestros datos

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ACTIVE @ WORK

PROCEDIMIENTO DIARIO – SERVIDOR

1. Para entrar en el servidor, se tiene que ir al siguiente link:
   https://active.inov.pt/aaw-vat/#/staff

2. Introducir tu usuario asignado y la contraseña por defecto

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ACTIVE @ WORK

¡VAMOS AL SERVIDOR!.........

5/4/2017   14

ACTIVE @ WORK

PANTALLA PRINCIPAL DEL SERVIDOR

Aparecen los mensajes de alertas y recomendaciones recibidos de los sensores

Aparecen los mensajes recibidos del mentoring tool

datos de usuario y cambio de contraseña

5/4/2017   15

ACTIVE @ WORK

COGNITIVE SYSTEM

5/4/2017   16

ACTIVE @ WORK

COLLABORATIVE MODULE

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ACTIVE @ WORK

MENTORING TOOL

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SKILL DEVELOPMENT MODULE

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ACTIVE @ WORK

LO QUE SE ESPERA DE TI

1.- USAR EL SENSOR TODOS LOS DIAS QUE ESTEIS EN LA OFICINA

2.- RELLENAR VUESTRO CV LA PRIMERA VEZ QUE ENTREIS

3.- ENTRAR EN LA APLICACIÓN DEL SERVIDOR DIARIAMENTE AL MENOS 10 MINUTOS A ULTIMA HORA DEL DÍA PARA:

- CONTESTAR AL CUESTIONARIO DE WELL-BEING DIARIAMENTE AL FINALIZAR LA JORNADA.
- UTILIZAR LOS MODULOS MENTORING TOOL
- REVISAR TUS NIVELES CARDIACOS EN MEASUREMENT
- PROPONER NUEVAS IDEAS CON EL COLLABORATIVE MODULE

4.- EN TELETRABAJO, USAR EL MODULO DEL SERVIDOR SOLAMENTE

5/4/2017   20

ACTIVE @ WORK

EVENTOS

WORKSHOP

DONDE: MADRID
CUANDO: 25 ABRIL
DURACION: 2 HORAS (A DEFINIR)
HORA INICIO: 11:00 – 13:00 ????

ENTREVISTAS PERSONALES

DONDE: MADRID
CUANDO: 25 ABRIL
DURACION: 30 MIN CADA UNO
HORA INICIO: DESPUES DEL WORKSHOP

5/4/2017   21

10. Annex II: Active@Work user Guide

MSIC has prepared a new version of the user manual, including updated functionalities and modules, presented in the pilot second phase.

This Manual will be submitted as a separate file.