

Requirements meet solutions: How to successfully transfer stakeholder needs in AAL projects¹

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Developing Active and Assisted Living (AAL) products and services is a challenging process. A multidisciplinary team of researchers, developers, user representatives, and other stakeholders are involved in the development process, aiming at designing and implementing solutions that meet the actual needs and wishes of the users. One of the biggest challenges in this process is to make sure that user requirements are successfully communicated and implemented. However, this process is often difficult since the involved parties have different backgrounds, experiences and expectations.

Within the interactive session, we discussed how these challenges can be met best for the benefit of future users. We specifically addressed the following questions: How to deal with multidisciplinary project teams? What are useful methods for communicating user requirements? How to ensure the implementation of user requirements in the development process? What can we learn from failures regarding the communication and implementation of user requirements?

The topics were discussed in small groups of 6-8 people. Each participant could join two groups during the interactive session. The main findings and central issues of the discussions are described in the following paragraphs.

Topic 1: Dealing with Multidisciplinary Teams

During the discussion the tension between benefits (from working in multidisciplinary teams) and the threat of miscommunication due to different backgrounds of group members was discussed. A key success factor that has been identified was a proper project management. A variety of different issues that need to be considered when working in a multidisciplinary team were raised:

- **Diverse Tasks:** People in different organizations have different tasks outside the project, these may interfere with (the progress of) their project work;
- **Different Expectations and Needs:** Different organizations have different views towards a research and development project. Where a research institute may see a project as a great way to explore new technological advances, it may be a way to make money for an SME. This leads to different expectations and needs among team members;
- **Different perspectives:** Different organizations tend to deviate from the working plan.

Workshop participants agreed that it takes some time during the project to see how each team member and organization find its role within the multidisciplinary team. A list of actions to improve the communication and to align the interests and needs of the different team members has been developed.

- **Regular face-to-face meetings** during which the team members speak out their mind: What are their interests? What are their ways of working?
- **Find a balanced way.** As the project manager it is important to find a middle course between the interests of the project and the different interests of the team members. And

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keep in mind that these interests may change over time, and therefore, the balance may need to be adjusted.

- **Give people ownership and responsibility** for a part of the project plan so that they are forced to take action and collaborate.
- **Communication.** Ask team members to work closely together to learn enough about each other's subjects so that they can communicate on more or less the same level.

Topic 2: Useful methods for communicating user requirements

The discussion upon methods to communicate requirements when developing AAL solutions revealed a variety of interesting findings as well as challenges. "Focus groups" were mentioned as one of the most well-known methods to gather user requirements. However, the recruitment of the end-user participants was identified as complex process and it was discussed that it is not always easy, e.g., to find participants, who bring in different perspectives. Diverse groups that include primary end-users (i.e. seniors) and their caregivers trigger even more fruitful ideas within the system development. However, it was also discussed that it is important to avoid too high numbers of users during one session in order to take into account all the different needs. Face-to-face interviews were identified as another valuable method, however, can easily increase the resources that are needed.

Workshop participants also discussed the importance of use case scenarios, however, pointed out that it is valuable to have "open scenarios" that leave space for users' imagination and creative ideas.

One idea to present a system and to get users feedback is to include the stakeholders, who are developing the system (SMEs, developers, technicians, etc.). This way the system creators can give pitches of their systems and the end-users can interact directly with them without any intermediate communicators. On one hand, the developers directly receive user feedback to improve their products or services and, on the other hand, the end-users can see the different services that have been developed for them.

Topic 3: Ensuring the implementation of requirements in the development process

Within the third group it was discussed, how to ensure that requirements are actually addressed and implemented within the development process. On one hand, participants shared experiences how they normally make sure that user requirements are addressed, on the other hand challenges participants face were discussed.

With regard to our first question "*How do workshop participants "normally" make sure that they actually address the user requirements they have identified in the beginning of the project?*" the following issues were part of our discussion:

- **Iterative Evaluation Circles.** Most of the participants agreed that they apply iterative evaluation circles, i.e., several focus groups, pilots, and workshops throughout the whole development process. However, it was discussed that although this approach helps to stay focused on the user it does not actually ensure that their needs are addressed.
- **Research through or in design.** Hardly anyone was familiar with approaches such as "research through design"⁷ or "participatory design"⁸ nor has ever applied one of these approaches. One workshop participant stated that these kinds of methods seem to be easily

⁷ see Zimmerman et al. 2007

⁸ "PD is an approach that focuses on collaborating with the intended users throughout the design and development process, rather than designing a system "for" them." (Ellis & Kurniawan 2000, p. 264)

applicable in the area of AAL, however, have potential to ensure that user requirements are addressed.

- **Involvement of different stakeholders.** Involvement of all kinds of different stakeholders within the process was considered important. One workshop participant, for example, reported about a project in which they developed an app to support older adults managing their daily life. They included older adults, their formal and informal care giver, and other family members, who are part of older adults' life, but forgot about including the perspective of service givers (e.g., supermarket chains).
- **Including potential users in the proposal writing process.** With regards to users' requirements one participant raised the idea of including potential users actually in the proposal writing process. This would allow potential addressees to actually articulate their needs/requirements and could influence the scope of the proposed solution.
- **Check points.** Another mechanism that was suggested to ensure that requirements are actually addressed, were so called "check points". One workshop participant, for example, suggested quantifying requirements (through objective and subjective assessment) to make it possible to "measure" requirements. Although it might be difficult to operationalize qualities such as trust, it might be an approach to make sure that user needs are addressed.

With regard to our second point of discussion, i.e., "*What are challenges within the process?*" the following issues were discussed.

- **Appropriate translation of user requirements.** Within the discussions, one of the biggest problems was the translation of requirements between project partners. In this context participants discussed that it is important that partners in the project actually agree on requirements that are identified in the beginning of the process. This means that these requirements are not taken for granted. A negotiation process is required in which, for example, the technical partners need to agree on the requirements, i.e., that these issues are addressed in the development process. Consequently, the negotiation process was mainly discussed with regard to communication process, i.e., the way the requirements are communicated.

Topic 4: Failures and Lessons Learned from the requirements analysis and development process

Within regard to the fourth topic, failures in the requirements assessment, communication and implementation as well lessons learned were discussed. Several issues around working with requirements were identified:

- All too often, there is a **conflict between the project interests and the own ones** (e.g., company's). This can lead to different expectations between the stakeholders in terms of the implementation of the requirements and its outcome. The outcome then fails to meet the different expectations. This is also often accompanied by missing trust in other partners.
- **Developers often do not communicate with the researchers** (who assessed the requirements), if they are unsure about certain requirements and take decisions on their own. Another potential problem can be a missing prioritization of requirements, which can result in the implementation of unimportant or easy to implement requirements first. Additionally, it can be that technological limitations overrule the requirements.
- Developers can also be stuck with **user requirements that are not fitting anymore**. This issue could easily be solved with communication and iteration of requirements with all stakeholders, but all too often developers are stuck in their linear (waterfall) thinking/working and are not agile enough.

Participants reported also about successful AAL project that failed to come to the market. For example, by developing a too global solution that tries to meet all assessed user requirements,

instead of focusing on one feature/function that can more easily be brought to the market. Another example is developing a too innovative solution that is then too expensive. The reported issues related to the last phase of the project, where the often missing transfer of user requirements into business requirements (which should happen as early as possible) and that there is often a problem with intellectual property (IP), i.e., who owns what?

The participants agreed that a good project management could take care of most of these issues, if they are known. Therefore, sharing such experiences with others is very valuable to prevent other projects from failing.

Summary

The discussions within the groups revealed a variety of different topics, whereas some of them were considered important in all the different groups, e.g., stakeholder involvement. Addressing their needs as well as varying interests were, for example, not only identified as a challenge when working in multidisciplinary teams, but also considered as an important prerequisite to ensure the implementation of valuable AAL solutions. In this context, communication between all involved parties was considered important. Thus, we could identify a tension between challenges and potential pitfalls.

The discussions revealed that the transfer of stakeholder needs is a complex process and that it is not only about applying appropriate methodological approaches but to recognize and accept different stakeholder needs. Therefore, also framing conditions such, for example, a proper project management, were identified as key factors in the development process.

Overall, the discussions allowed participants to reflect upon their experiences, to exchange best practices and to develop first approaches to improve the transfer of stakeholder needs.

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