

Deliverable 9 - Evaluation report of training and the use of training tools

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Project Deliverable Report

Deliverable 9 - Evaluation report of training and the use of training tools

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Abstract	<p>Training contributes to improving handover practices. Deliverable 9 describes the design of a Handover toolbox to support trainers and others involved in improving handover practices. The deliverable describes the design of the blueprint, the development into a first and second prototype and the final toolbox version. The development process used a design-based approach in which evaluation and development were closely intertwined. We used conventional methods for data collection including interviews and questionnaires, but also innovative methods including Writing Personas, PMI evaluation and Group Concept Mapping.</p> <p>The toolbox offers advanced opportunities to become an appealing and leading on-line network that enables members to</p>

contribute actively to the body of knowledge stored in the toolbox. The network becomes the place for all healthcare providers to be involved in improving handover practices. Evaluation findings indicate that the final version of the Handover toolbox sufficiently meets the needs of users and the toolbox has sufficient quality and content to allow further implementation. The deliverable concludes with suggestions for further implementation of the Handover toolbox.

Keywords list

Patient safety, Handover, Training, Competencies, Quality, Toolbox, online network

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1. Introduction

When a patient's transition from the hospital to home is less than optimal, the repercussions can be far-reaching – hospital readmission, adverse medical events, and even mortality (www.handover.eu). This discontinuity of care (i.e., the responsibility for the patient is handed over from one caregiver to another) can lead, if not acted upon properly, to severe adverse events to the patient and enhanced costs to system. Standardisation of handover practices by implementing standardised handover models is regarded as a powerful solution to increase the quality of handovers. A generally acknowledged manner to implement these models is to train clinicians in improving clinical handovers. In Deliverable 9, the second and last to be produced within Workpackage 4, the design and evaluation of the training and other tools that were developed during the second and third years of the HANDOVER project are presented. The HANDOVER project plan Deliverable 9 will entail:

- Create a blueprint for the design
- Development of training materials
- Evaluate the developed materials
- Modify materials based on the evaluation of outcomes.

A design-based approach was applied in which the process of evaluation and design of the tools and training was developed in an iterative process. In total three phases could be distinguished in this process that are each described in this deliverable: The design of the blueprint (chapter 2), development and evaluation of the prototypes (chapter 3), and the final version (chapter 4). The deliverable concludes with some conclusions and recommendations for future work (chapter 5).

2. The design of the blueprint

The Handover toolbox was developed to contain all types and kinds of tools to improve handover practices rather than developing a single handover training. This chapter discusses the initial design phase of the Handover toolbox which lasted from October 2009 until June 2010. During this phase the following design issues were tackled: the consequences of the Deliverable 1 (also produced by Workpackage 4) for the design of a training program (section 2.1), the most appropriate design approach for designing the toolbox (section 2.2), the audience of the toolbox (section 2.3), insights from learning network theory (section 2.4), and selection of the most appropriate technical platform (section 2.5). These design issues contributed to the development of a blueprint in the form of a paper-based version of the toolbox demonstrating the key features of the toolbox (section 2.6).

2.1 Findings from Deliverable 1 and their consequences for Deliverable 9

In Deliverable 1, the first deliverable produced within Workpackage 4, three issues that contributed in different ways to the activities carried out in Deliverable 9 were addressed but which also especially influenced the interpretation of how best to develop a ‘a training for handover activities’.

The first issue is that training, as stated in Deliverable 1, is a powerful *measure* to enhance the implementation of (standardized) handover models. Training and learning should *not* be regarded as the intervention itself. Instead, training - when designed and delivered properly – is regarded as a supportive, accompanying and even necessary condition to encourage implementation of the proposed handover model (Deliverable 1, p. 11). For the activities in Deliverable 9 this means that designing training will not be sufficient to solve the problematic situation of handover. The solutions lie in a multi-pronged combination of several elements such as an effective training, evaluation of tools, protocols, methods, checklists for standardized handovers, ensuring transfer of training and developing tools to change the culture of handover. The training is thus just one component. All components need to be validated and reliable and together they can contribute to improvement of handovers.

The second issue raised in Deliverable 1 is the impossibility of a one-size-fits-all training program because handover practices, culture, training needs and training conditions vary tremendously across and even within European countries. Designing a single handover training program, would address only a fraction of the different problematic aspects of handovers experienced in the different European countries.

The third and final issue refers to the insights into how to design and deliver a handover training provided by the interviews with training experts that were conducted for Deliverable 1. In Deliverable 1 we recommended to continue interviewing training experts after finishing the work on Deliverable 1 to further deepen and broaden our understanding on this topic. In addition, Deliverable 1 emphasised taking into account the perceptions of the potential training audiences and therefore recommended gathering data regarding the conditions that impact the willingness of various clinical groups and professionals to participate in handover training (Deliverable 1, p. 13).

These three issues were addressed during the course of activities of Deliverable 9. It resulted in the decision to reframe the initial idea of creating a one-size-fits-all handover training program into developing a training platform—the Handover toolbox. In this toolbox several tools, guidelines and suggestions will be provided that support training experts, and others, in designing their own training adjusted to their own local handover problems and training needs. This decision was approved and welcomed by the HANDOVER project management because it better meets the demands and offers maximum flexibility to ability to locally customize future training programs.

2.2 The applied design approach

We used a user-centred design approach, a Participatory Design (PD) approach. This approach offers a sound balance between the efforts and contributions of designers and users in the process of designing applications (Stoyanov, Kicken, Boon & Bitter, 2011). The basic idea behind PD is to include those who will be affected by the design in the design process. PD regards designing as a progressive, iterative refinement process through a cyclical prototype development, relying on gradually increasing users' involvement in the design. Like most of the current user-centered design methodologies, PD does not seek for perfection in the earlier stages of design. It is rather a continuous improvement and refinement process of creating solutions, examining them and re-creating new solutions.

Evaluation plays a prominent role in this process because it provides evidence on how the latest solution fits with the needs of end-users or other stakeholders. In this process of creating and examining solutions, the interrelatedness of design and evaluation are at the heart of the design-based research tradition in which the goal is to provide credible evidence for a particular solution. However, at the same time it attempts to exceed this local level of formative evaluation by seeking ways to further develop theoretical notions (Barab & Squire, 2004).

2.3 Knowing the audience of the Handover toolbox: interviews and personas

It is important to gain insight into the needs of the end-users of the toolbox - the clinical training experts - before designing the toolbox. For this purpose interviews with training experts were conducted in order to create personas.

2.3.1 Interviews with training experts

Interviews with training experts from Spain, Poland and The Netherlands, were used to compose three personas. In total 35 interviews were conducted (including 18 that were conducted during the work for Deliverable 1). Participants for these interviews were selected by the project partners participating in Workpackage 4: 11 training experts from the UMCU (The Netherlands), 12 from FAD (Spain), and 12 from CMJ/NCQA (Poland) were interviewed. The training experts were professionally engaged in secondary care but some of them were working in primary care contexts: 3 in Spain, 4 in Poland and 5 in The Netherlands, respectively.

The interview scheme for the interviews was composed in cooperation with all project partners participating in Workpackage 4. The final version of the interview scheme consisted of questions regarding a number of training design topics that are essential for designing training and learning in the context of handovers. These topics were: group composition, instructional activities, nature of the meetings, advantages and disadvantages of formal assessments and certification, how to increase motivation for training attendance, and how to assure transfer of training.

2.3.2 The technique of writing personas

Personas are richly presented, highly detailed descriptions of the typical user of a product, which help designers to understand whom they are designing for. Persona is a concept becoming widespread in the modern software engineering design and popularized by Alan Cooper, the developer of Visual Basic. Personas are based on methods for data collection (e.g., interviews) from which archetypes are composed. Personas are not stereotypes. Stereotypes are a product of designers' biases and assumptions rather than based on empirical data.

Creating personas helps in making the assumptions about a target audience more explicit, making the generic and sometimes vague design target of 'users' who are capable of anything, to become a specific 'person' having specific characteristics. Traditionally user-

centred design involves defining the needs of as many users as possible and collecting all of their requirements. This results in a long list of needs with no sense of priority. The lack of direction is typically translated into designs that are trying to serve all users but ends serving no user particularly well. (Cooper, Reimann & Cronin, 2007, p. 79.)

A persona is a synthesis of elements drawn from several users who share common job roles, demographics, and user need characteristics. Personas must be context-specific – they should be focused on the behaviours and goals related to the specific domain of a product. Without adding some personality choices and flare, personas can easily turn into generic users instead of precise design targets. Adding life to the persons is therefore important; they have names, likenesses, clothes, occupation, families, friends and even pets and possessions.

2.3.3 The composed personas

Three personas were created based on the interviews: *Dirk* from The Netherlands, *Maria* from Spain, and *Janusz* from Poland. Box 1 provides an excerpt of the persona of Maria. Appendix A provides a detailed description of the three composed personas. It was decided to compose country-specific personas since the interview findings indicated some considerable differences between countries regarding handover practices and related training needs.

These personas, Dirk, Maria and Janusz, are thus not one of the interviewees, but they represent the sum of needs gleaned from the group of interviewed training experts of each country. These personas help to visualize the needs of training experts in Poland, Spain and The Netherlands who will be using the toolbox. Moreover, the personas were useful for presentations where they were introduced to inform the audience about the needs, opinions and considerations of training experts across Europe.

Maria from Spain

Maria emphasizes that caregivers should acknowledge explicitly that the responsibility for handover is not restricted to a single caregiver but it should be experienced as a collaborative and shared responsibility, and caregivers should act accordingly. Maria is in favour of handover training that allows trainees to be actively engaged, rather than sitting and listening to some kind of lecture. She feels that mixed groups, consisting of nurses and doctors, is most appropriate but at the same time she is cautious about this. She is very concerned about how to convince personnel to attend training in handover. Moreover, she feels that training is necessary but not sufficient to change the existing attitude and handover practice, which definitely requires a considerable change of culture.

2.3.4 What should training experts do in the Handover toolbox

Based on the writing personas and ongoing discussions with the HANDOVER project team members, it was decided what activities the training experts should be able to perform with and in the Handover toolbox. Finally, the following list of requirements was composed reflecting the most likely actions to be performed by the users of the toolbox:

- *Searching and retrieving* various kinds of information about training in handover;
- *Sharing* different kinds of information (e.g., uploading existing documents, sharing thoughts through blogs);
- *Participating* in discussions;
- *Rating* existing information (e.g., tagging, adding comments); and,
- *Creating and maintaining* a user profile that informs others about one's work duties, interest and expertise in handover.

These requirements were further defined and translated into a technical use case and a domain model that points to all required technical objects needed for the toolbox (see Appendix B). During the initial design phase this domain model served as a visual presentation of the different components that needed to be designed and included in the Handover toolbox.

2.4 The Handover toolbox as a learning network

The idea of a toolbox was inspired by contemporary notions of the learning network concept, which has two central features. Firstly, the learning network concept focuses on supporting processes in which people learn with and from each other. A learning network is in many ways akin to social networks (e.g., LinkedIn, Facebook), but differs from them in that they are specially designed to foster professional exchange. Participants within a learning network have access to both other participants and resources. Moreover, participants can easily and actively *contribute* to the existing body of knowledge stored in the learning network by answering, for example, questions posted by others and by adding information themselves (e.g., documents, blog posts, videos, comments). This feature distinguishes a learning network from traditional websites which are designed to merely provide static information, offering none or only limited opportunities for a proactive and contributing role of visitors to this website. Secondly, learning networks are online environments which allow access at times and places most convenient for participants. Moreover, the use of the latest available technological functionalities offers numerous possibilities for participants to keep well-informed about the latest developments within their learning network.

The concept of the learning network is highly influenced by theories on communities of practice (see, for example, Wenger, 1998; Wenger, White and Smith, 2009) that indicate the conditions under which professionals are able and willing to learn with and from each other. More elaborated views on the concept of the learning network are present in the research of Sloep (2008) and Sloep, Van der Klink, Brouns, Van Bruggen & Didderen (2011) and focus on the further empirical investigation of the learning network concept.

Creating a toolbox as a learning network creates the potential to attract increasing numbers of different people across Europe and even beyond, who are interested in contributing to the knowledge on improving handovers. This would make the Handover toolbox the place to turn to for the latest information and discussions about handover practices.

2.5 Selection of the platform

In our search for the most appropriate technical platform, it was concluded that the idea of a static website did not fit the requirements for the Handover toolbox. Though websites usually do offer some facilities for interaction (e.g., discussion forum) they do not provide facilities for high levels of various kinds of interactions. Especially for emerging issues that are the subject of ongoing discussions, entailing many different aspects and different views.

Different types of pre-selection criteria were used in the process of selecting a suitable technical platform for building the toolbox:

- Expertise concerning development and implementation. In order to guarantee an efficient development process, the OUNL as developing partner, needed to select a platform that they utilized in previous projects. This hands-on expertise encouraged a rapid and smooth development process.
- Open Source license. The platform and all its contents need to be under an open source license to make it available after the project concluded and to be used by any interested medical community or organization.
- Sustainability of the toolbox. The platform needs to fulfill certain sustainability aspects to guarantee that any partner of the Handover project can maintain the toolbox after the lifetime of the project. Therefore, the toolbox needed to apply most commonly applied software as core system that can easily be hosted, adjusted and maintained by other organizations.

- Matching of functionalities. The implementation platform needed to fulfill the requirements that were found during the analysis of training expert interviews (see section 2.3.4).

According to these four pre-requirements three platforms were selected: Liferay, Drupal and Elgg, which will be briefly introduced hereafter.

- *Liferay* is an open source social collaboration software for communities and organizations. It offers different communication channels, group formation, and a broad range of additional plug-ins. It is written in Java and requires a Tomcat server to be hosted. OUNL can offer plenty of tools for describing competences, making individual study plans, and creating learning paths for instance.
- *Drupal* is an open source content management system and runs on the LAMP (Linux, Apache, MySQL, and PHP) platform. It is used as a CMS system for at least 1% of all websites worldwide, ranging from small personal blogs to large corporate and political sites. Drupal provides options to create a classic website, a single- or multi-user blog, or a community website for user-generated content. It takes advantage of a large community of developers that continuously contribute new plugins and improve the software. OUNL has experience with adjusting the system and adding to it.
- *Elgg* is an open source social networking software that provides individuals and organizations with the components needed to create an online social environment for communities. It offers blogging, micro-blogging, file creation and sharing, networking, group management, newsletters, and RSS feed aggregation. Elgg powers several hundred thousand social networks world-wide and has been particularly successful in business and education. Elgg is also written in PHP and requires therefore the LAMP (Linux, Apache, MySQL, and PHP) platform. OUNL has experience with adjusting the system and building on its platform.

The functional analysis was transformed into a set of criteria and the three candidate platforms were judged by the OUNL team on these criteria (see Table 2.1).

Table 2.1 Decision matrix for the platform

Selection criteria	Candidate platforms		
	Drupal	Elgg	Liferay
Discussion forums	2	2	2
User blogs	3	3	3
Group blogs	2	3	2
Email lists	2	2	2
Notifications	2	2	2
Repository	3	2	3
Add links	2	2	2
Upload documents	2	2	2
Download documents	2	2	2
Add video	2	2	2
Activity overview	2	2	2
Notifications	2	2	2
Create groups	1	3	2
Cross references	1	3	1
Create webpage	2	2	2
Tag content	2	3	2
Rate content	3	2	2
Wiki	3	3	2
Connection to social networks	3	2	0
Newsletter	2	2	2
Recommendations	3	1	1
Personal activity overview	1	1	2
Web 2.0 sources	2	2	2
	49	50	44

Legend: [0 = not available, 1 = available but requires developing effort,
2 = available, 3 = advanced feature]

Elgg and Drupal earned almost comparable numbers of points (50 and 49, respectively, Table 2.1). Finally, it was decided to select Elgg because this platform requires less technical developmental efforts for building a toolbox in the short term. Moreover, Elgg requires less complex expertise for maintenance which makes it also more attractive for organizations to adopt and host the toolbox after the lifetime of the HANDOVER project.

2.6 The paper-based version

Based on the information presented in the previous sections a first paper-based version of the Handover toolbox was constructed. The aim of this version was to generate commitment, ideas and responses useful for steering the process of its further development into a first prototype. The paper-based version was presented and discussed during a meeting with HANDOVER project team members from Workpackages 1, 3 and 5 in Utrecht on June 25th 2010. The paper-based version consisted of a three-step analysis that provided insights into the backgrounds, functional requirements, and the look and feel of the proposed Handover toolbox.

The three-step analysis consisted of:

1. A use-case diagram to get a conceptual view on the collected needs (see Appendix B, Figure 1).
2. A diagram that visualized the required connection between the functionalities of the toolbox (see Appendix B, Figure 2),
3. A visual dummy of the toolbox that showed a first draft of the look and feel of the proposed toolbox.

The paper-based version emphasized the following:

- The Handover toolbox does not only supply information, it also serves as a place where training specialists meet and share their experiences. Next to conventional functionalities common for websites the Handover toolbox offers additional functionalities that allow the toolbox to serve as a learning network. For that purpose the toolbox offers several opportunities for training specialists to:
 - add their own information sources to the existing collection of information already available in the toolbox;
 - comment on and rate the existing information in the toolbox; and,
 - discuss particular topics with fellow training specialists.
- The Handover toolbox can serve as a meeting point for trainers and their training participants. Thus the toolbox has the potential to evolve into an online community that attracts various visitors interested in training about handover issues.
- The Handover toolbox acknowledges that visitors to the toolbox differ regarding their stage of concern and/or responsibility for handover practices, ranging from becoming aware of the problem to senior managerial responsibility for hands-on practice in clinical work settings. This requires varied content on a range of different topics to be included in the toolbox.

The presentation and discussion at the meeting in Utrecht revealed high levels of commitment for the proposed toolbox. The concerns expressed during this session pointed to:

- The perceived audience for the toolbox. It was recommended not to focus exclusively on training experts but also to aim at reaching out to others who are interested in handover

issues, like students nurses and doctors, as well as trained practitioners bearing responsibility for improving handover practices.

- Seeking a sound balance between a traditional website and the learning network aspects. It is of utmost importance that visitors to the Handover toolbox can easily search and find information on various handover topics. Though the learning network aspects of the toolbox were appreciated and perceived as crucial for the viability of the toolbox in the long run, the majority of the visitors will be initially attracted by the free access to interesting and useful information. Perhaps later they will start to discover and use other functionalities, like discussions, uploading their own materials, etcetera. This means that the information included in the Handover toolbox should be evidence-based and well organized.
- The user-friendliness of the toolbox. There is need to pay sufficient attention to ensure high levels of user-friendliness, especially because senior staff are not used to navigating in social network environments like the proposed Handover toolbox.

3. Development and evaluation of the Handover toolbox

This chapter commences with an explanation of the main features of the Handover toolbox (section 3.1), a description of the first prototype (section 3.2), the evaluation of the first prototype (section 3.3), the work on the second prototype (section 3.4), the evaluation of the second prototype (section 3.5), and an overview of the work activities while finalizing the toolbox (section 3.6). The last section, section 3.7, is dedicated to examples of handover training. Though the sections hereafter provide information in an easy accessible manner, it is recommended to visit the Handover toolbox at www.handover.ou.nl for a more comprehensive overview.

3.1 Main features of Handover toolbox

There are four basic features that need explanation to better understand the activities and evaluations. These are: groups, static information, dynamic information, and modes of participation.

Groups

The core element of the toolbox is the notion of groups, meaning that information related to various aspects of handovers are categorized and presented by groups (see also the Handover toolbox: <http://handover.ou.nl/pg/groups/all/?filter=newest>). Each group has a theme and a group leader who initiated the group and gathered the initial information. In these groups visitors can search for information and can also add their own information, discuss issues and rate the quality of available information. Groups usually have free access policies (open group) so everyone is able to see and download the information in this group. Everyone who is a registered member of the Handover toolbox can become a member of a group. Membership allows more possibilities for active participation, for example for uploading one's own materials to the group. However, some groups employ a restricted policy (closed group), meaning that the group leader decides who can become a group member or not. This is particularly useful for trainers who want to use the Handover toolbox as a place where their trainees can find information and can discuss with fellow trainees without being hindered by the presence of any outsiders. Groups gather, check and present information regarding certain topics, groups unite people with similar interest in particular topics and the kind of topic determines whether a group has an open or restricted (closed group) membership policy.

Certified information

To ensure the quality of the information a distinction has been made into certified and community information. Since every member has the possibility to upload information there is the danger that information is stored in the toolbox that is not reliable, lacks sufficient scientific basis or can even be counterproductive from the perspective of improving handover practices. To assure the presence of high quality information regarding handovers, a section in the toolbox contains 'certified information', called Handover Tools. This information is selected by group leaders who were already responsible for one of the groups in the Handover toolbox (see <http://handover.ou.nl/pg/pages/view/3587/>). The Handover tools present the most important and promising tools to improve handover practices. The information in this part of the toolbox can not be altered or removed by any member, but can only be changed by the administrator of the toolbox.

Community information

Beyond the certified information stored in the Handover Tools section of the toolbox there is also the possibility that group members add information. This information can be stored in the groups and this information can be uploaded and edited by any member of a particular group. Community information refers to the fact that everyone can add his/her own materials to the toolbox. Next to materials like texts, the possibility of adding dynamic information also includes placing comments, contributing to discussions, and blogs.

Modes of participation

There are three modes of participation: visitor, member and group leader. First, everyone can be a visitor and consult the information, stored in the Handover toolbox without being registered as a member. Second, after registration and membership more advanced options for active participation are available, such as uploading your own materials, commenting, rating and discussing. Finally, every registered user can start his/her own group and become a group leader.

3.2 Handover toolbox version 1

The OUNL team worked between July 2010 and October 2010 on further designing and developing the first prototype version of the Handover toolbox. The aim of this first

version was to demonstrate a working prototype, a demo version, showing all different kinds of possibilities to an audience of potential toolbox users.

First, the themes of the groups and the kind of information to be provided in these groups was decided upon. In total five groups were composed that referred to different phases of the training design: ‘needs analysis’, ‘training design’, ‘content of the training’, ‘training methods’ and ‘training evaluation’. These groups were initiated in the toolbox by members of the OUNL team. Each group was organized using the same format: a welcome text to inform visitors about its group goals and content, group pages with subtopics and group files containing the tools (e.g., articles, figures, checklists). In addition, the functionalities for active engagement (adding dynamic information) were available, like blogging, discussions, uploading files. Certified information was not yet available in this version. There were no limitations regarding access to the toolbox; its access was free, but only registered members could utilize the more advanced toolbox options.

3.3 Evaluation of the Handover toolbox version 1.0

3.3.1 Participants and method

During the HANDOVER project meeting in Brussels on October 13th – October 15th, 2010, the demo version of the Handover toolbox was presented to the HANDOVER project team members and to 62 external experts. Both groups were included in an evaluation session in which they were asked to provide feedback to the designers of the toolbox by means of the Plus, Minus Interesting (PMI) method (De Bono, 1992). This method offers a simple and quick way to generate information about the toolbox, which can be analysed and used for the further development of the toolbox. The participants received a comprehensive demonstration of the Handover toolbox and while doing so, were invited to write on post-it notes their ideas about (a) things they like in the tool (plus; marked as P or +), (b) all concerns they have or weakness they see (minus; marked as M or -), and, (c) interesting ideas or suggestions regarding the improvement of the toolbox (interesting; I or +/-). Each idea was written on a single post-it note formulated as a statement (e.g., ‘Use findings from research to develop content’). The participants were advised to write down everything related to the toolbox thus preventing discarding of ideas prematurely. The participants were given time at the end of the session to clean, edit and organise their ideas, before submitting them to the evaluators.

The PMI evaluation was conducted during two separate sessions, one with members of the HANDOVER project team and another with invited experts. Both of them were conducted during the project’s meeting in Brussels (October 13-15, 2010). In total 62 experts participated in the PMI exercise, of whom 22 were members of the HANDOVER project team and 40 were invited external experts.

3.3.2 Analysis

The participants generated 219 statements. Table 3.1 provides an overview of the number of statements per group and category.

Table 3.1. Number of collected statements per group and per category

	Plus	Minus	Interesting	Total
Handover project team members	41	61	36	138
Experts	31	13	37	81
Total	72	74	73	219

The invited external experts generated relatively more positive and fewer negative statements while the project team members generated more negative statements. Because the purpose of this evaluation was to improve the toolbox, the analysis concentrated on the ‘minus’ and ‘interesting’ statements. For this analysis, first the list of 147 ‘minus’ and ‘interesting’ statements was reduced to 62 statements by excluding identical or similar statements, unclear and unreadable statements. Next, the statements were sorted using the card sorting method supported by the websort software (<http://websort.net/>).

3.3.3 Findings

The 62 interesting statements were clustered into 5 groups: purpose, content, target group, usability and technology platform. In table 3.2 these groups are explained and examples are given. Appendix C contains a detailed overview of all statements and their allocation to each of the 5 clusters.

Table 3.2 Groups and examples of statements within these groups

Group	Description	Examples of statements
<i>Purpose</i> (12 statements)	Statements are related to issues about why Handover toolbox was developed; what kind of tool is it: training or intervention tool?; what it supports: building community, education or both?; is it a self-sufficient training tool or need to be used together with other tools?; and how to make it attractive for the end users.	<ul style="list-style-type: none"> ▪ <i>Toolbox = intervention</i> ▪ <i>Should be part of intervention; Together with all other learning and other platforms;</i> ▪ <i>This can be a great challenge because you can provide magnificent tools but the key is to get people to use them;</i> ▪ <i>Be very clear about for WHOM it is a toolbox. WHY it is a toolbox for me and WHAT I can find there and what I can give OTHERS.</i>
<i>Target</i> (13 statements)	Statements are related to the appropriateness of the Toolbox for the handover training experts	<ul style="list-style-type: none"> ▪ <i>Think about users that will develop training (older than 40 years old; Will they appreciate this 2.0 solution?);</i> ▪ <i>Might limit usage to young generation;</i> ▪ <i>Adapt system to internet use habits of target group;</i> ▪ <i>TB looks complicated for healthcare professionals.</i>
<i>Content</i> (17 statements)	Statements are related to suggestions for including the results from the other Workpackages within the HANDOVER project; to develop the content using research findings; and that the content needs to be constantly and dynamically updated.	<ul style="list-style-type: none"> ▪ <i>Lack of link between the content of the toolbox and found barriers in handover;</i> ▪ <i>Show where the best practices are;</i> ▪ <i>TB content, like SBAR = solution for handover problem;</i> ▪ <i>Two ways to look into the content of the toolbox: - search for examples/practical; -learning from other experiences;</i> ▪ <i>Will there be a state of the art overviews on for example SBAR, written by European experts.</i>
<i>Usability</i> (17 statements)	Statements are related to user interface, navigation, structure and organisation of the information in the toolbox	<ul style="list-style-type: none"> ▪ <i>Need for basic information: what is TB;</i> ▪ <i>what kind of tool can be found on this site; why is the TB made;</i> ▪ <i>how can a contribution be made; It takes a lot of time to go through the toolbox by yourself;</i> ▪ <i>Navigation is too complex to get one's very concrete needs;</i> ▪ <i>With accumulating content it can become difficult to find what you're looking for;</i> ▪ <i>Needs cultural adjustment.</i>
<i>Technology Platform</i> (3 statements)	Statements are related to the use of specific technological solutions.	<i>Too internet dependent.</i>

3.3.4 Conclusions

The outcomes of this method indicate the usability and the content of the toolbox were a point of concern and needed special attention in the development of the second prototype. The results of the evaluation provided sufficient input for improving the toolbox.

3.4 Handover toolbox version 2.0

From November 2010 until April 2011 the first version of the Handover toolbox was further developed into a second version. Based on the findings of the PMI method and the ongoing discussions within the HANDOVER project team, several activities were employed to improve the toolbox. At the end of this section a screenshot is presented that offers insight into how the second version looked like. The screenshot presents the toolbox homepage for a logged in member. Hereafter a brief overview of the main activities is given.

Expansion of the content

The evaluation found the need to broaden the intended target group of the toolbox from training experts only to other stakeholders as well. Students, nurses and doctors and even patients were mentioned as possible target groups. This implied a need to broaden the type of information presented in the toolbox. For that purpose the naming of the groups was adjusted, some groups were deleted and new groups were created that were closely related to topics researched in the HANDOVER project. For instance, the group ‘How can I train communication skills durin handover training’, was renamed as ‘Communications skills, knowledge, Awareness and Attitude’, and, the group ‘How do I decide what to train’ was deleted.

The groups were revised and eventually, the toolbox contained the following 8 groups:

- How to use the toolbox
- Design of a training
- Protocols, checklists and other standardized tools to improve handover
- Communication skills, Knowledge, Awareness and Attitude: how to improve these for an effective handover
- Empowerment of the patients during handover practices
- External and organizational factors influencing the effectiveness of handover
- Methods of training
- Evaluation of training

Together these groups covered the most significant topics that are addressed in the various Workpackages included in the HANDOVER project. Each group was assigned a leader. The OUNL created a format for the groups that included the following elements:

- A welcome text with information about the particular theme of the group.
- Group pages with information regarding subthemes or for example a list of interesting websites.
- Page files with proposed tools and other information, like articles useful for improving handover.

All groups employed an open access policy meaning that every visitor of the toolbox had access to the information stored in that particular group.

Safeguarding the quality of the content

The fact that anyone can upload information to the toolbox and can even start an own group was regarded as an appealing feature of the toolbox. However, this raises the chances that in the long run the Handover toolbox may contains information which is not always entirely reliable or even counterproductive for improving handovers. To assure the quality of the information the toolbox was extended with a section representing ‘certified information’, called Handover tools. The content of this part of the toolbox can not be altered by visitors of the toolbox, but only by the administrators of the toolbox system¹. Guidelines and support were provided by the OUNL team and in close cooperation with the group leaders. The composed texts included references to the most reliable tools, which were also stored in the toolbox (i.e., in the groups).

Improving the user-friendliness of the toolbox

From the evaluation of the first prototype it became clear that certain aspects and functionalities of the toolbox were too difficult to use, especially for users who were not acquainted with social media. To improve the toolbox’s usability, a ‘How to use the toolbox’ section was added, which is a manual that explains the possibilities of the main functionalities of the toolbox. Moreover, visitors can also use this section to place their questions and comments on usability issues. In addition, adjustments were made to improve the graphic design and some buttons were renamed or re-arranged in order to increase their meaningfulness for visitors.

¹ The role of administrator is performed by the OUNL

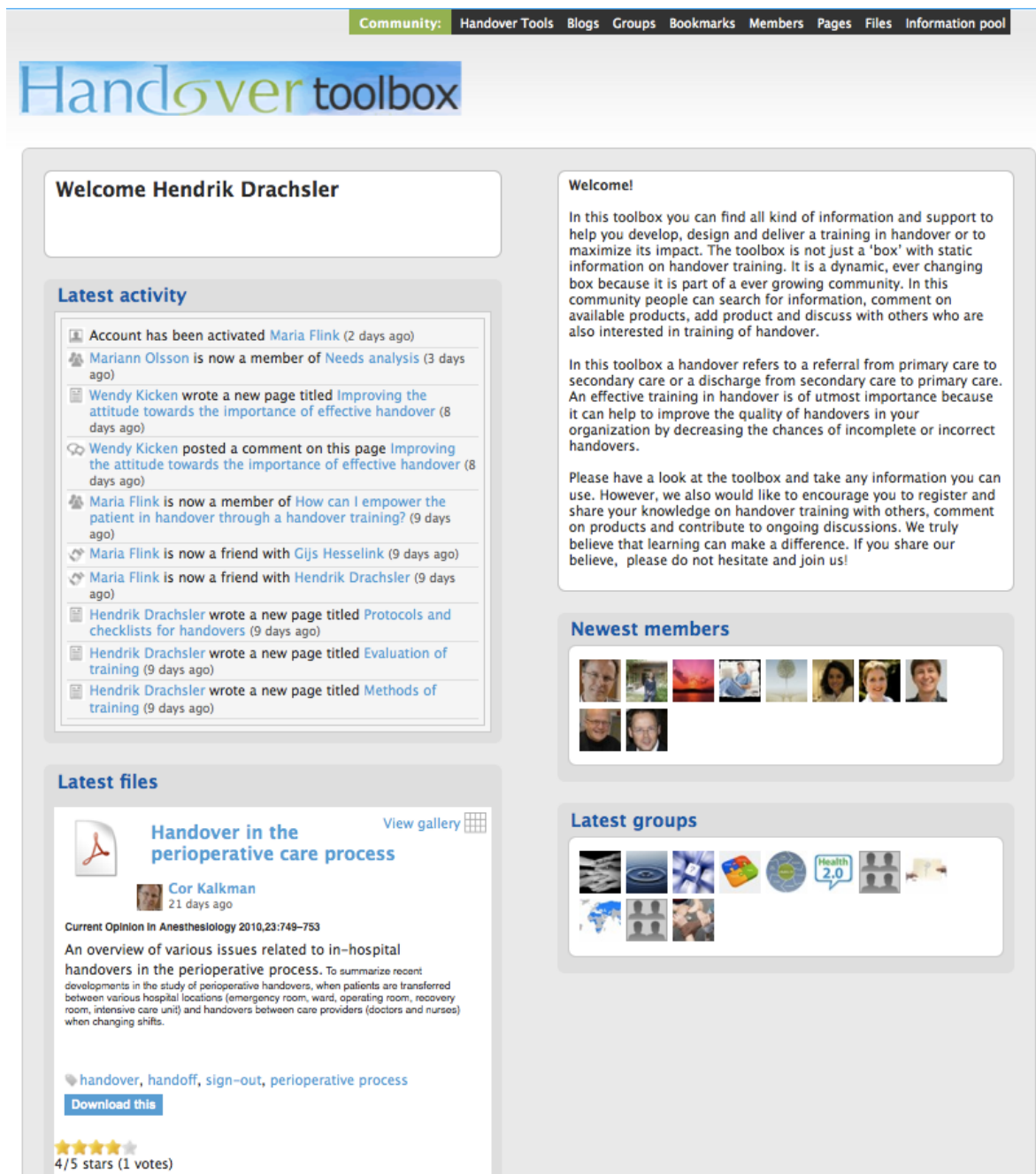


Figure 3.1. Screenshot of the homepage of the second version of the Handover toolbox

3.5 Evaluation of the second version of the Handover toolbox

The evaluation of the second version consisted of two activities: 1) a formal evaluation carried out with participants who actually used the toolbox, and, 2) an evaluation by external experts present at the presentation of the Handover toolbox during the HANDOVER project

meeting in Amsterdam on April 8th 2011. The section first presents the findings of the formal evaluation followed by the findings of the presentation and the subsequent group discussion.

3.5.1 Methodology

The formal evaluation of the second version of the Handover toolbox focused on collecting information from healthcare training experts and medical professionals on what works and what does not work in using the toolbox. The evaluation was carried out by the HANDOVER project partners with 13 individual users (i.e., training experts and medical professionals) from FAD in Spain (n = 4), KI in Sweden (n = 4), and UMCU in The Netherlands (n = 5), during March and April 2011². Guidelines were developed for conducting these sessions to ensure comparability of the evaluation sessions. Templates for reporting the qualitative and quantitative findings were composed. The evaluation sessions of individual participants were designed in which the following activities were carried out:

1. Introduction and demonstration of the toolbox;
2. Asking the participant's first impression of the toolbox;
3. Testing the toolbox by asking the participant to perform three tasks within the toolbox, while thinking aloud during performing these activities;
4. A short interview followed by a questionnaire consisting of 16 items with Likert-scales and questions about participants' backgrounds. Slightly different versions of the questionnaire for training experts and other medical professionals were used;
5. Closing of the session, concluding comments, remarks, expressing appreciation to the participants.

3.5.2 Findings from the sessions with users

This section presents the findings of the tasks, the questionnaire and the short interviews. The performance of the Dutch participants was relatively lower than the performance of the Swedish and Spanish participants on working through the handover tasks. The Dutch participants required assistance in completing tasks in the toolbox whereas participants from Sweden and Spain more often were able to finish the tasks successfully without any additional guidance.

² CMJ/NCQA also conducted two sessions with Polish users, from whom the data were received in July 2011. These findings are not included in this Deliverable, but will be taken into account for the forthcoming article about the toolbox evaluation.

Table 3.3 displays the means and standard deviations of the questionnaire items. These findings indicate that participants were positive about the Handover toolbox as an engaging environment offering useful information about training. They were slightly negative regarding the user-friendliness of the toolbox and the amount of available information. Moreover, some standard deviations were rather high (see for example item 4 and 10) indicating participants vary in their judgements of these aspects. Further examination of the findings revealed that compared to the Swedish and Spanish participants the Dutch participants were, in general, less positive in their judgements.

Table 3.3. Means and standard deviations of the questionnaire items (n=13)*

Statements	Mean	SD
1 Toolbox helpful for designing training	3.69	.95
2 Toolbox provides requested information	2.67	1.07
3 Toolbox is easy to learn to use	3.62	.96
4 Mistakes in the Toolbox can easily and quickly be solved	3.23	1.36
5 Navigating is easy in the Toolbox	3.31	1.25
6 Moving from one task to another is easy	2.92	1.12
7 The Toolbox responds as expected	3.15	1.41
8 The Toolbox increases curiosity about training.	3.77	1.17
9 The Toolbox motivates further exploring	3.92	1.19
10 I would recommend this Toolbox to others	3.54	1.39
11 I am eager to explore different things with the Toolbox	2.69	1.03
12 I have the knowledge and skills to use the Toolbox	3.54	.66
13 I have sufficient access to help when I need it.	2.85	1.28
14 I do not need help for using the Toolbox.	3.23	1.24
15 I felt confident using the HTB.	3.23	.93
16 I would like to use the HTB after the pilot.	3.62	1.12

* 5-point rating scale ranging from 1 = Strongly disagree to 5 = Strongly agree.

The interview findings were in line with the questionnaire's findings and provided more details about issues that deserve further attention in the process of finalizing the Handover toolbox. Almost all participants emphasized the potential of the toolbox. However, there remain usability, structure and content issues that deserve attention. Defined by the participants as 'a social network for healthcare trainers', 'a web of webs', 'better than Google', the toolbox is considered as a useful environment for finding information about handover, as it saves time and effort to find useful information. The advantages of saving time

and effort are seen as potential benefits, but do not apply to the performance of the current version, as participants from Sweden and Spain mentioned. Although the current version of the toolbox has still some serious flaws, a healthcare trainer could use the present model design a training program on handover as Spanish participants expressed.

The participants from all three evaluation sites provided suggestions on how best to better structure the toolbox by: (a) defining clearly what the purpose and who are the target groups of the toolbox; (b) better structuring of the toolbox according to the needs of different target groups (e.g., physician and nurses, and training specialists); (c) providing an instant overview and classification of what can be found in the toolbox, and, (d) using user-friendly and intuitive terminology, avoiding technical terms, such as ‘widgets’. Finally, concerns were expressed regarding the social network nature of the toolbox since experience with social networks is generally quite modest among the intended toolbox audience.

3.5.3 Findings from the presentation for experts

At the project meeting in Amsterdam on April 8th, 2011, 17 experts were invited to listen to and comment on a demonstration of the Handover toolbox. The demonstration consisted of a general introduction, followed by in-depth presentations of group leaders who demonstrated the content of their own group. During the demonstration and the discussion a number of suggestions were raised that can be grouped into three categories. The first category refers to strategic issues such as the financial resources for continuation of the toolbox after the project and the issue of reaching out to a non-English speaking audience. Suggestions pertaining to the second category refer to improvements of the content, like prioritizing tools based on research evidence, solving problems with member registration procedure, safeguarding the quality of the content, improving the navigation in the toolbox, initiatives for starting new groups in the toolbox (e.g., storytelling), and inclusion of an evaluation form for visitors. The third category finally consists of suggestions concerning the further implementation of the toolbox to assure that the target group is going to be sufficiently encouraged to consult the toolbox and becoming engaged and active in contributing and sharing information.

3.5.4 Conclusions

The evaluation of the second prototype version revealed issues that deserved attention in the process of finalizing the Handover toolbox. The number of participants involved in the formal evaluation was sufficient to collect data on the main points of improvement. The

presentation and group discussion with external experts generated, next to usability issues, suggestions for improving the viability of the toolbox in the long term.

3.6 Finalizing the toolbox

This section briefly lists the developmental activities that were carried out from May 2011 until September 2011 to further improve the content, the usability and the communitarian aspects of the Handover toolbox. First, the Handover toolbox was migrated to the latest version of the Elgg platform. Secondly, on the basis of the results of the evaluation sessions presented in the previous section and the ongoing discussions in which many HANDOVER project team participated, the following goals were central in the last stage of the development of the Handover toolbox. A more elaborated version of the work in the final stage of the project is presented in Appendix D.

1. With regard to the content of the Handover toolbox the following activities were employed:
 - improving the texts in the static part of the toolbox on the basis of guidelines and format;
 - improving the welcome text at the homepage, for example by adding hyperlinks for quicker access to particular parts of the toolbox;
 - improving the welcome texts of the different groups to inform better and quicker about its actual content;
 - integration of different groups on training issues into one group to enhance searching information on training issues; and,
 - including videos with accounts of project members about importance of handover and the toolbox.

2. Concerning the usability the following activities were carried out:
 - making the search button more visible;
 - simplifying the membership procedure;
 - re-arranging the buttons with the most important buttons positioned more centrally;
 - improving possibilities for finding 'help'.

3) With regard to improving the use of the communitarian aspects of the toolbox the following activities were carried out:

- Enhance the use of the rating functionality to rate the quality of files stored in the toolbox;
- Including possibilities for bookmarking;
- Improving quality of membership profiles of the HANDOVER team members;
- Guidelines for group leaders with practical recommendations to encourage visitors to become more active as a group member.

3.7 Example of a training

During the course of the work on Workpackage 4 it was decided to reframe the initial idea of designing a blueprint for training and developing a toolbox. The first reason for this shift was that training experts across Europe face a range of very different handover issues. They work in very different European contexts with various professional groups. A blueprint of training does not meet their needs to flexibly design their own training which corresponds to their own local needs and conditions. The second reason is because of the range of handover issues that differ in various countries, the HANDOVER project did not come up with a recommendation for a single model/solution for improving specific handover practices. The absence of a practical model or solution makes it impractical to develop a training blueprint since the training content can not be derived from the proposed solution or model.

We choose to offer practical training tips and materials that support training experts in designing their own training. The work was partly grounded in data gathered during the HANDOVER project, which will be presented in section 3.7.1.

3.7.1 Findings from training experts, doctors and nurses

First, attention is paid to the data collected among training experts, followed by the data collected among doctors and nurses. We conducted 35 interviews with training experts in Poland, Spain and The Netherlands on order to develop the personas that are described in section 2.3.1. Next to writing personas this data was used for determining frequently expressed themes concerning design and content of handover training. The main common themes that were frequently mentioned during these interviews are displayed in Table 3.4.

Table 3.4. Common themes regarding the content and design of handover training

Theme	Explanation
Training content	Show effects of poor handover practices Emphasize the importance of communication Demonstrate the processes, workflow and people involved Pay attention to attitudes toward patients and colleagues
Training methods	Use methods that require active engagement of trainees, such as role playing, simulation, interactive lectures, collaboration in small groups Follow-ups are necessary
Training group	Mixed training groups consisting of nurses and doctors collaboratively learning and working on improving handover practices
Training evaluation	Evaluation at the end of the training but also assess the long-term effects of training on handover practice
Other	Use incentives to increase motivation for attending the training (e.g. certificate)

The fact that these themes were quite common does not necessarily imply all training experts agreed upon them.

3.7.2 Findings from clinicians (doctors and nurses)

In order to gain insight into training preferences and needs regarding handover from the perspectives of those who will be trained, 96 primary and secondary doctors and nurses from The Netherlands (n = 23), Spain (n = 28), Sweden (n = 23), and Poland (n = 22) were provided with a questionnaire. The questionnaire consisted of rating items and open questions, asking for the participants' opinions regarding (a) what should be trained during a handover training (i.e., the content), (b) how this should be done (i.e., the design), and, (c) what are the factors that will influence the success of a training (i.e., the implementation).

The findings of the questionnaire demonstrated that with respect to the topics of the training, the participants agreed that attention should be given to (a) alertness to vulnerable groups, (b) communication skills, (c) knowing what to hand over, and, (d) awareness of the handover over of patient responsibility during handover. The use of tools and standardized procedures are considered as slightly less important topics.

Regarding the training design participants prefer conventional training sessions with practical assignments in small, heterogeneous groups consisting of both doctors and nurses (see Table 3.5).

Table 3.5. Percentage of participants that favour training design aspects

	% of participants who favour this
4 hours	47
1 day	47
Several days	19
Small group	83
Large group	12
Self-study/e-learning	22
Learning on the job	80
Heterogeneous group	80
Homogeneous group	32
Assignments	87
Examination	26

Finally, with respect to the factors influencing the success of training, the factors could be grouped into the following five categories: trainer characteristics, trainee characteristics, training delivery, promoting participation, creating favourable workplace conditions for training transfer.

3.7.3 Findings from training experts and medical specialists

Group Concept Mapping was applied to generate ideas for handover training from the perspective of training experts and medical specialists (GCM) (Kane & Trochim, 2007; Stoyanov, Hoogveld & Kirschner, 2010; Trochim, 1989). GCM applies a structured approach to facilitate groups of experts to identify and arrive at a consensus about a particular issue--in this case the characteristics of handover training. It uses the original respondent input from any qualitative method as units of analysis for data collection to facilitate participants using sorting and rating, and then requires aggregating their contribution to allow clear structures to emerge from the data.

Four researchers were involved in writing Deliverable 1 and were given the task to extract ideas about educational interventions to improve clinical handovers. Examples of extracted ideas were for example: ‘Look for a standard approach to handover communication’, ‘Adopt methods already used in other domains (i.e., Crew Resource Management, I-SBAR, Five Ps, I-PASS-THE-BATTONT)’, ‘Shift attention from one doctor-one patient relationship to cross-cover patient commitments’, and ‘Apply job aids’. 252 statements were derived from the text, resulting in a final set of 105 unique statements after removing identical statements.

The list was sent to 14 healthcare professionals and 7 training experts. The participants represent different EU countries such as Sweden (7) the Netherlands (7) Poland (2), Germany (2), Bulgaria (1), Spain (1) and Italy (1). The participants were asked to first sort statements

on similarity in meaning and next to rate them on importance and feasibility. Figure 3.2 presents the results from the analysis of the data sorting.. The closer the statements (as represented by the dots) are to each other the closer in meaning they are.

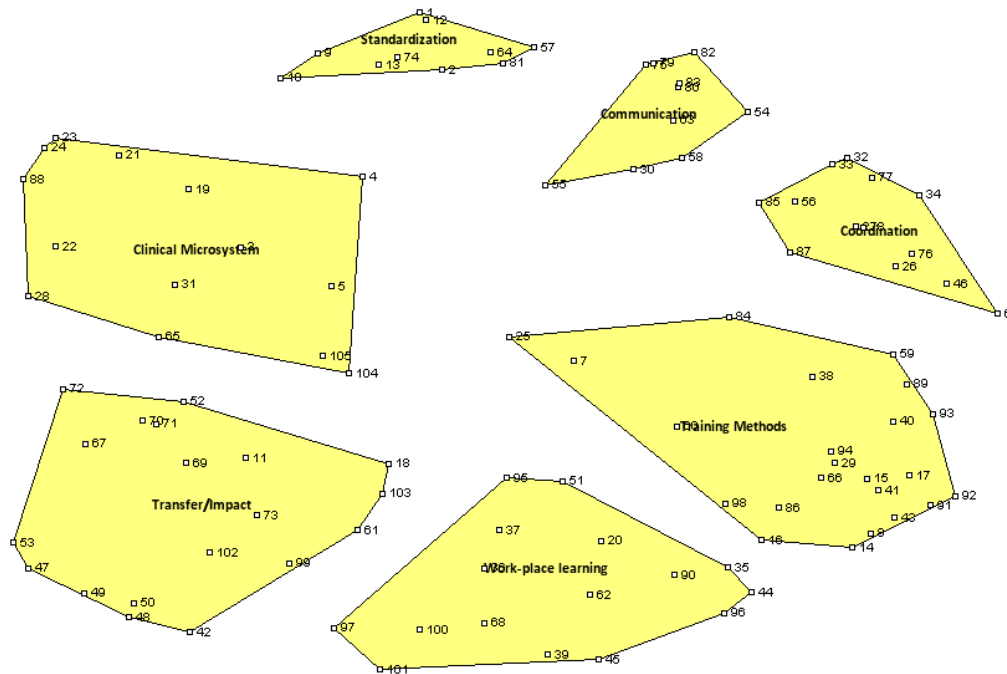


Figure 3.2. Handover training clusters produced by GCM

Figure 3.2 demonstrates there are seven clusters regarding the handover training suggested by the hierarchical cluster analysis each consisting of several statements: (1) standardisation, (2) communication, (3) coordination of activities, (4) training methods, (5) work-place learning, (6) transfer/impact, and (7) clinical micro-system.

The statements represent clusters of standardisation, communication, coordination and training methods as separate clusters but multidimensional scaling (MDS) puts these clusters closer to each other. This clustering suggests that they represent the are in need of formal training in handover. There are three content issues that must be addressed during handover training: Designing and implementing standard handover guidelines and protocols, discussing communication models and coordination of activities, respectively. The statements in the cluster Training Methods refer to different instructional design approaches but also suggest the need to combine different approaches.

The results of the study suggest that a clear distinction has to be made between formal training and other handover interventions, such as redesigning the clinical micro-systems of

patient care. Standardisation scored the highest on elements of importance and feasibility. This may suggest that the first thing to do in redesigning the clinical micro-system is to develop standard protocols and guidelines for handover practice. The distance between the formal training zone and the cluster transfer/impact zone implies that the participants did not associate formal training with transfer of knowledge, skills and attitudes, and the impact it might have on handover practice. Although there is no direct connection between formal training and other handover interventions, a non-direct link between them exists through the bridging role of workplace learning, a cluster that scores lower than the formal training clusters but higher than the clusters of clinical micro-systems and transfer/impact on feasibility. Formal training could contribute to changes in the clinical micro-system if it had a real impact on handover practice. A means for such an impact is successful transfer of handover knowledge, skills and attitudes. However, a transfer that leads to such an impact could only happen if measures are taken for providing effective support in the clinical work place.

The GCM study provides empirical evidence for the need of providing not only formal training in handover, but also to the importance of supporting workplace learning and facilitating communities of practice.

3.7.4 Outline of the training

When developing handover training five steps need to be taken (see the [article](#) on the ADDIE model): Analyze, Design, Develop, Implement and Evaluate. For each step or phase the toolbox offers several building blocks (i.e, alternatives) that can be selected by the training developers. In addition, the toolbox describes a generic training which is based on a selection of building blocks selected by the HANDOVER project team members. This selection is based on the data gathered as described in the previous paragraphs, and a literature review (described in Deliverable 1). This generic training can be taken as a starting point which can then be customized by adapting the building blocks to the needs of the trainees.

The generic handover training

Prior to the development of the training it is important to perform a training needs analysis to decide on the design of the training. The needs analysis provides insight into the needs of the trainees enabling the trainer to customize the training. It is important to be aware of external and organizational factors that have the potential of enhancing or hindering the uptake of handover practices and the success of the training. After the training trainees should

be able to apply what is learned during training in their workplace. More information on these issues can be found in the group [External and organizational factors](#).

The training needs analysis based on interviews, questionnaires and process mapping (see also [this guide](#)), a global idea of the content of the training can be created. The intervention mapping was used to make the final decisions on what intervention(s) should be trained to resolve the handover problems. Problematic handovers can often be tackled by training of knowledge, skills and attitudes of those who are involved in handover. This means that effective training should handle not only communication skills, knowledge of mental models and use of handover tools and instruments, but should also aim to change trainees' attitudes towards handovers. Handover training should focus on the role of the patients during handover and how this role can be used by medical professionals to improve handovers. More ideas, information and tools with respect to the content of the training can be found on the toolbox in the groups [Communication skills, knowledge, awareness and attitudes](#), [Protocols, checklists and other standardized tools](#), and [Empowerment of the patients during handover](#).

It is important that the group of trainees (10-15 persons) represent all parties involved in a handover: the sender, receiver and patient. In this way, handover practices can be simulated during role play to practice communication skills and tools, but also to experience the idea of shared mental models. This can be alternated with short content based lectures by the trainers in which strategies or communication models are explained. In addition, different stakeholders can share their experiences during handover from their perspective and learn from each other. Sharing of experiences and authentic cases of problematic handover can also contribute to awareness raising. Examination is not necessary, but trainees should receive some certification.

In addition to training skills, knowledge and attitudes, several measures should be taken to ensure transfer of training. These include mainly organizational issues that go beyond training, such as promotion of the training and creation of conditions to enable trainees to apply in the workplace what was learned during training.

Good evaluation using the Kirkpatrick model that includes: (1) appreciation & participation, (2) cognitive effects, (3) behavioural effects, (4) and, organizational effects. In the toolbox more information can be found on [Kirkpatrick's model](#) or on other [evaluation methods](#).

Customization of the toolbox

The generic training can be customized by first analyzing the training needs and performing an intervention mapping to decide what the content of the handover training will be and what practical matters should be taken into account. Tabel 3.6 provides an overview of the building blocks available in the toolbox for each phase of the training design.

Table 3.6. Examples of building blocks per design phase

Phase	Examples of building blocks in the toolbox
Analyze	<ul style="list-style-type: none">▪ Instructions for training needs analysis▪ Questionnaires▪ Interview schemes▪ How to perform intervention mapping
Design	<ul style="list-style-type: none">▪ Communication skills▪ How to empower the patient▪ How to train for impact
Develop	<ul style="list-style-type: none">▪ Video-clips to raise awareness▪ Vignettes for role play▪ Protocols and checklists for handover▪ Leaflets for patients
Implement	<ul style="list-style-type: none">▪ Measuring organisational factors▪ Benchmark for safe handover
Evaluate	<ul style="list-style-type: none">▪ How to use Kirkpatrick's model▪ Questionnaire for trainees▪ Questionnaire on attitude

4. The final version of the Handover toolbox

The final version of the Handover toolbox provides a solid learning network infrastructure that is similar to social networks like Facebook or LinkedIn but differs from them in that the Handover toolbox is specially designed for training experts, doctors and nurses involved in handovers, and even stakeholder groups, like patient associations. In the toolbox they can find information grouped per topic, share experiences and exchange knowledge on a diversity of topics pertaining to handovers.

The best way to get a good impression of the toolbox is to visit www.handover.ou.nl. Here a brief overview of the main features of the Handover toolbox is provided followed by a summary of the evaluation of the final version.

4.1 Overview of the main features of the Handover toolbox

The screenshot shows the Handover toolbox homepage for a logged-in member named Hendrik. The page features a navigation bar with options like 'Personal Cockpit', 'Apps', 'Settings', and 'Administration'. Below the navigation bar, there's a search bar and a 'Log out' button. The main content area is divided into several sections:

- Welcome Hendrik:** A personalized greeting box.
- Latest Handover interviews:** A section featuring a video of Prof. Dr. Gunnar Öhlén from Karolinska University Hospital, SE. Below the video, there's a description of his work and a link to his profile.
- Dr. Slavi Stoyanov:** A section featuring a video of Dr. Slavi Stoyanov from the Centre for Learning Sciences and Technologies (CELSTEC) at the Open University of the Netherlands. Below the video, there's a description of his expertise and a link to his profile.
- Latest activity:** A list of recent network events, such as 'hearity has joined the network (14 hours ago)' and 'chenhongjuan has joined the network (4 days ago)'.
- Welcome to the Handover Toolbox!** A central message box providing an overview of the toolbox's purpose and encouraging users to share their experiences and join groups.
- Members:** A section displaying a grid of member avatars, with tabs for 'Newest', 'Most popular', and 'Logged in'.
- Featured groups:** A list of featured groups, including 'Handover Training', 'Protocols, checklists and other standardized tools to improve handover', 'External and organisational factors influencing the effectiveness of handover', and 'Communication Skills, Knowledge, Awareness and Attitude: how to improve these for an effective handover'.

Figure 4.1. Screenshot of the homepage for logged in members

Handover tools

The main outcomes of the HANDOVER project are stored in the section that we called 'Handover tools', which consists of thematic texts with 'certified information' on important subjects. These texts refer to the most important and reliable tools for improving handover practices and these tools are also stored in the toolbox so visitors can download them easily. These texts have been carefully composed using a similar structure. The texts have been reviewed by different project members to assure the texts reflect the main outcomes and the most appropriate tools. This part of the toolbox also offers a link to video fragments with accounts of HANDOVER team members that

emphasize the importance of improving handovers and the advantages of the toolbox. At the top of the screen (see Figure 4.1) visitors see a menu bar that also has a button linking to these tools but also the welcome text offers a link that immediately directs the visitor to the Handover tools (see Figure 4.2).

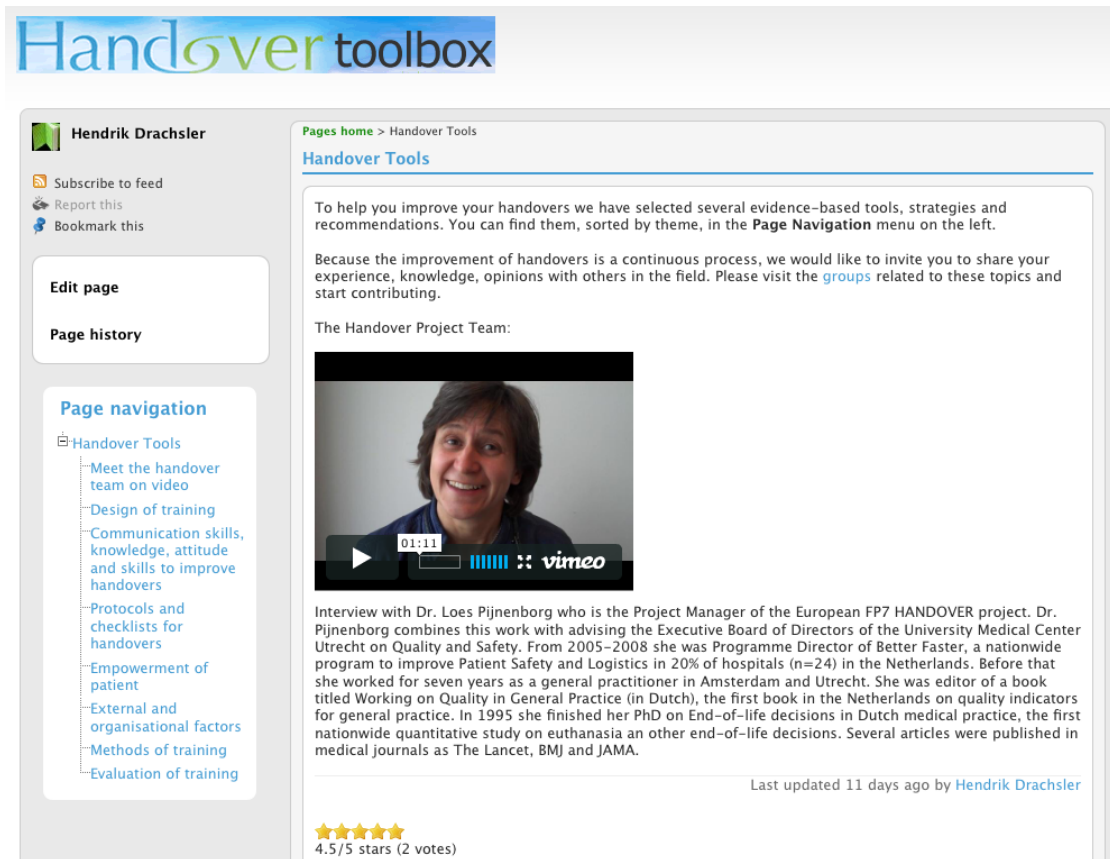


Figure 4.2. Screenshot of the first page of the Handover tools part of the toolbox

Groups

Groups are at the heart of the toolbox. They serve as special interest and expertise groups and are dedicated to particular topics. Figure 4.1 shows that these groups can be approached through the menu bar (top of the screen) by clicking on 'Groups' but also by clicking immediately on one of the groups that appear at the bottom of the homepage. These groups offer different kinds of information and opportunities to actively engage in discussions and exchange of ideas. Groups usually have an open access policy (open groups) but some groups have restricted membership (closed groups). The opportunity for members to create their own group can be considered as an important advantage of the toolbox. All open groups have a similar structure which supports visitors interests' in finding out quickly whether a group is of interest to them or not. See figure 4.3 for an example of one of the existing groups.

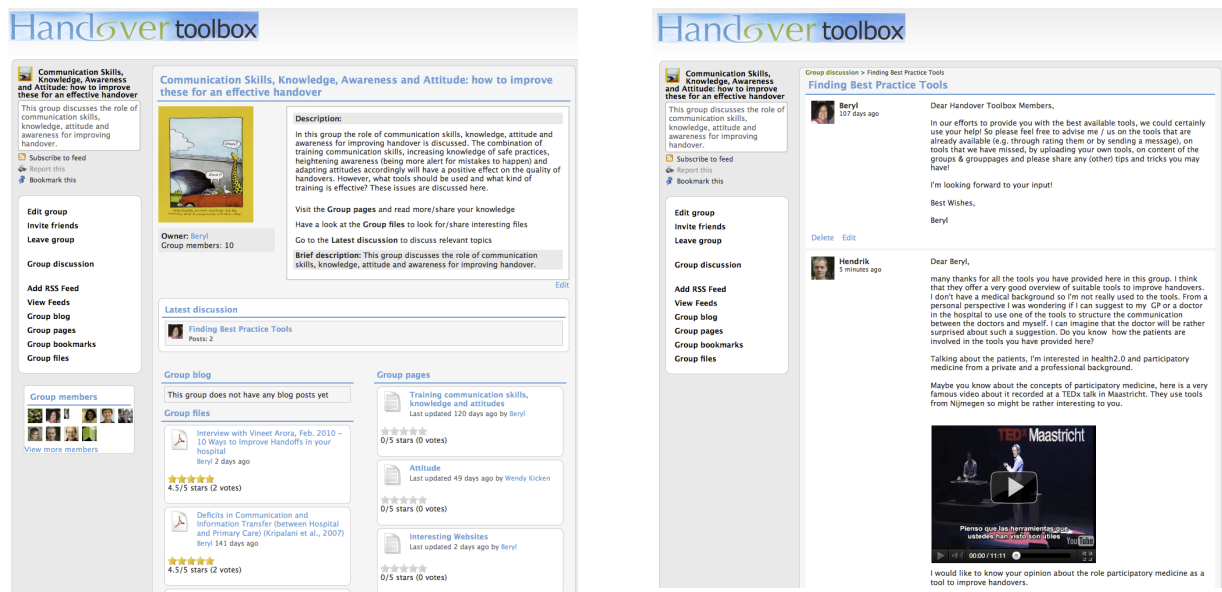


Figure 4.3 Screenshots of the group Communication skills, knowledge and attitudes

Members

The Handover toolbox members can use the toolbox to search for and exchange information in a digital way. They become part of an international community with similar interests in improving handover practices. The toolbox requests that members create a profile since this helps others to find members with similar interests or expertise in particular topics. The member registration procedure is straightforward. Registered members can join one or more groups and become group members with one mouse click. The number of registered members is growing at a steady pace. Presently there are there are 106 registered members.

Active participation for creating community information

The toolbox offers additional advanced features for members to contribute their information within groups in various ways (e.g., add bookmarks, upload files, create blog posts, link to videos on the web, etcetera). In addition, members can decide who has access to their contributions by determining the access level (e.g., public for everyone, only handover toolbox members, only members of a particular group). Since every member can add his or her information the body of knowledge within a group continues to evolve and is never ‘completed’. Experiences elsewhere reveal that the crowd is a strong mechanism for safeguarding the quality of the information (Sloep, 2008). If a member contributes unreliable information other members and especially the group leaders can likely react on that. In the long run the wisdom of the crowd will prevail.

Advanced options to keep well-informed

The Handover toolbox offers advanced options to support the process of knowledge sharing, for example RSS feeds for ‘subscribing’ to the latest information on particular topics, email notifications or search utility to quickly find persons and materials related to one’s search terms. The menu bar at the top of the toolbox (see Figure 4.1) provides access to the advanced options (e.g. personal cockpit) for members. The search utility (located at the right side of the menu bar) is also accessible for non-members.

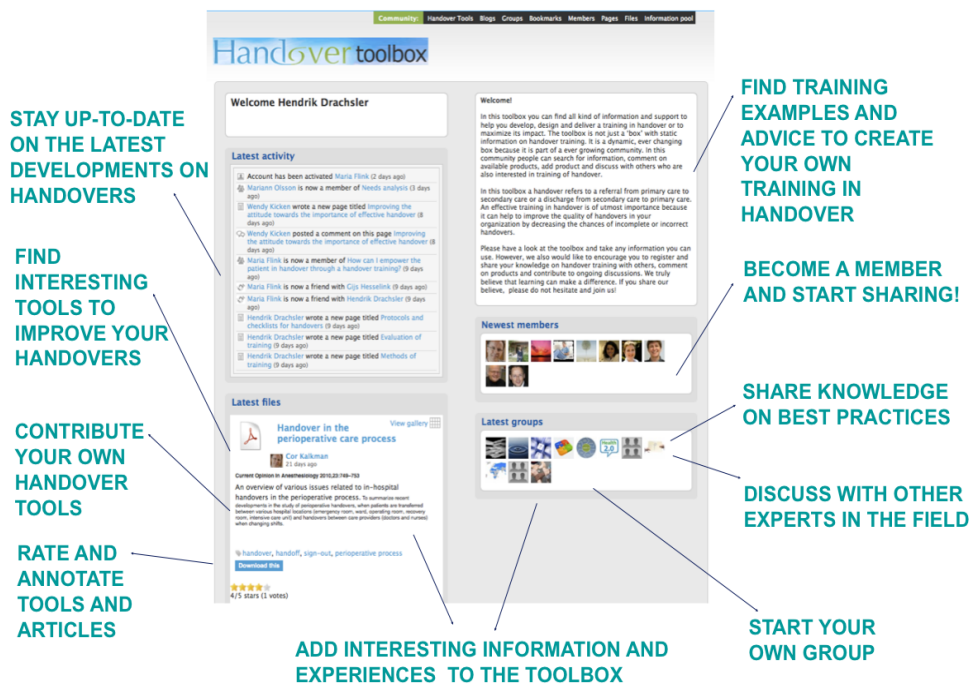


Figure 4.4. Handover toolbox features

4.2 Evaluation of the final version of the Handover toolbox

The invited experts were asked to evaluate the final version of the Handover toolbox prior to the final meeting on 22nd and 23rd September in Florence. The main aim was to gather information that is supportive for advancing the implementation of the toolbox at the conclusion of the HANDOVER project.

4.2.1 Participants and method

All experts that were registered for the Florence meeting received an e-mail with the request to perform pre-meeting assignments in the toolbox and to fill out a questionnaire. The assignments were, for example, registering as a member and exploring the content of one of the existing groups in the Handover toolbox. The participating experts were supported by a brief guide as to how to perform these assignments. Upon completion of these assignments the experts were invited to fill out an electronic questionnaire that consisted of 11 questions. In total 22 questionnaires were received. The main findings are presented in an aggregated level in the next section.

4.2.2 Findings

The experts were asked to write down the name of the group they selected to explore the content of the Handover toolbox. The findings reveal that three groups were quite popular: 7 experts selected the group on Handover training, 6 experts choose to explore the content of the group on Empowering patients, and 5 experts decided to explore the content of the group on Communication skills, knowledge and attitudes.

The experts were then asked for the reasons to choose that particular group. Two main reasons were pointed out: a close connection to their daily work, and their own curiosity. Some representative examples of answers were as follows:

- 'This is an area I'm involved in on a European level'
- 'I'm very interested to study handover using simulations for training program. A priority for our organisation'
- 'I'm especially interested in learning more about the role of patients in care transitions'

Thee experts were invited to rate the quality of the information stored in the group they had explored in the toolbox: 1 expert considered the quality as low, 8 considered the quality as average and 12 experts found the quality to be high. Next, they were invited to clarify their own rating and their answers showed that some experts' answers referred to specific components of the Handover toolbox, like the files and the group pages, whereas other experts mentioned particular content items. Examples of experts' responses were:

- 'Documents in the files section seem comprehensive and provide an opportunity for further reading about the topic'
- 'Training and communication skills were detailed and used good examples'

The experts were then invited to evaluate whether they consider the tools and information provided in the toolbox as recommendable to colleagues or friends. 19 recommended the toolbox to others. Again they were invited to clarify their own rating and the answers indicated that the experts already had clear ideas on what they consider in the toolbox as worthwhile for recommendation. The experts were invited to reflect on the possibility to start their own group within the Handover toolbox. 15 experts did not see any possibility to start a group; 8 experts consider the idea of initiating a new group as a real possibility, and one of them even formulated a very concrete theme for his new group: Handover training using simulation.

The experts were invited to advise the project team members about how to promote the toolbox as 'the place to visit'. The experts provided many ideas that can be grouped into the following categories:

- Language: the fact that almost all information stored in the toolbox is written in English could prevent it from large-scale implementation. Or as one of the experts wrote: 'I see a language problem. Those who should work with the tools might not be familiar with the English language'. It is therefore recommend seeking for opportunities to translate some of its content.
- Promoting the toolbox by assuring that other important websites provide links to the Handover toolbox. Also promote it through articles in journals in the domain of medical education. Contact medical schools to promote the use of the toolbox.
- Continue to work on the quality of the content. Assure that the toolbox presents the state-of-the art and that the hyperlinks to materials are still working.

- Adding other kinds of materials to the toolbox, like examples of best practices, videos with examples of what to do and what to avoid, provide best practice instructions.

The experts were invited to write down points of improvement regarding the toolbox. Their answers indicated that the following topics deserve attention:

- Technical issues like navigating through the toolbox, the long scrolling pages and improving the visual design
- Quality and classification of the information. Assure that materials stay up-to-date. Some materials are evidence-based whereas others are less grounded in sound research.
- Increase the active use of the materials. It is important to involve patients as members and to increase their ownership. Provide sections for different groups of users, like doctors, nurses, etc.

Finally, the experts were asked to mention ideas, questions or suggestions that were not addressed in the previous questions of the questionnaire:

- What to do with items in the toolbox that only receive poor ratings?
- It is necessary to assure the translations into other languages
- Accessibility, layout and usability is OK but information needs updates
- There are very nice articles and links
- Impressed by the quality of work
- Junior doctors are particularly welcoming a paperless system of accurate handover.

4.2.3 Conclusions

The questionnaire findings revealed that the experts consider the Handover toolbox as an environment that is useful and provides information supportive for improving handover practices. In addition, the suggestions and ideas also point at issues that deserve further attention in the work of the Handover toolbox at the conclusion of the HANDOVER project, like the issue of translation into other languages, implementation in medical curricula and the involvement of patients in the further development of the toolbox.

5. Conclusions and recommendations

Deliverable 9 reports on the development of the Handover toolbox to its present form. A participatory design approach was applied that closely linked design and evaluation. During each stage of the development of the Handover toolbox evaluation activities were conducted, and utilised for supporting decisions on its further design. This approach appeared to be successful; apart from gathering useful information for further improvements, this approach also contributed to engaging a considerable group of different experts.

The main advantage of the Handover toolbox lies in its potential to become an appealing and leading online network for those interested in improving handover practices. For that reason the initial focus of the toolbox specially designed for training experts has been replaced by a focus on a larger and more diverse audience. Next to training experts the toolbox also has been customized to the needs of others involved in improving handover practices, like doctors, nurses and stakeholders such as patients and patient safety organizations. Members can continue to contribute resulting in a viable and ever-evolving network that stays up-to-date, which is in strong contrast with conventional websites that usually become rather soon outdated after the project closing.

Although experts and project members were initially sceptic about the concept of the Handover toolbox they soon perceived its added value. New technologies and new ways of learning will need some time but also some assistance and encouragement to become accepted and appreciated. Moreover, it is necessary to ensure a sufficient level of usability. The final version of the Handover toolbox offers easy access to the certified information that presents the main research findings of the Handover project, and it also provides sufficient support for becoming acquainted with the more advanced options for active participation. So far, however, members consider the Handover toolbox too much as a traditional website and the use of the advanced options for active participation continues to be rather modest. This appears to be rather common in the initial stage of new networks. Future efforts are required to overcome this challenge.

The toolbox requires a critical number of users and groups that are devoted to improving handover practices and to learn about specific handover subthemes. The period in which this critical mass is reached is also called the *take-off* phase. After a critical mass of people are engaged in an environment like the Handover toolbox, this can become a reference place where people need to turn to in order to apply these tools to patient care. This is also

called the *fly* phase and reaching this phase requires efforts needed to widely disseminate the toolbox and implement it in partner organizations. A promising opportunity for this is the development of particular handover training courses in which the toolbox can play a powerful role as an innovative platform to exchange knowledge and experience on handovers in Europe and worldwide.

Another issue that deserves attention during the further implementation is the possibility of translating the toolbox into different languages. An advantage of the Handover toolbox is that everyone can launch a new group using any language they favor for the information and discussions stored in that particular group. The Handover toolbox offers an example of a Spanish group (with closed membership). Groups, closed or open, in any language will definitely contribute to the viability of the Handover toolbox in the long run.

It goes without saying that an environment like the Handover toolbox is never really finished but continues to evolve itself. To ensure that the Handover toolbox further develops to an advanced and leading community the OUNL will continue to host the Handover toolbox for the first year after the closing of the HANDOVER project. During that period the OUNL will look for a partner who is interested in permanent hosting of the Handover toolbox.

Last but not least, an environment like the Handover toolbox can only be realized if project partners are willing to closely work together during the design process. All partners have contributed actively to the development of the Handover toolbox and their support truly contributed significantly to its present form.

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Appendix A. The full description of the writing personas

Maria from Spain

There was another memorable Sunday night as Barca beat Mallorca to stay at the top of the Spanish League keeping the distance of 2 points ahead of the archrival Real Madrid. As one of the Barca Football Club Members, Maria is happy with the Barca performance and result, but back at home she is starting to think of the new professional challenge she is facing. As a coordinator of continuous education at the Hospital Trust of Barcelona, Public Health and Quality Unit, she was asked by management to organise training on handover. This request was triggered by various recent incidents of patients experiencing poor quality of care (and even a death) due to lack of communication and information transfer between the hospital and the primary care level.

Maria does not need to be convinced that improving handovers between hospitals and the primary care level is a very important topic, but although she has about 10 years of experience in the field of quality of care and patient safety, she does not have specific experience in training handover. Moreover, she believes that since the introduction of the shared information technology system, handovers from hospitals to primary care have improved substantially in the last 5 years. In addition, specialist visits to see patients at primary care level have added to these improvements. She is not sure yet that handover should be a special subject for training given the range of factors that influence handovers and given the existence of standard quality tools, such as process redesign, to improve them. Maria will accept the challenge but will try to convince her management that handover should be considered within the more general framework of quality and patient safety.

For the content of the training, the first thing to do is to collect information. Maria would certainly use her experience on teaching communication and patient safety, but she also would look at all available information about the topic, with a special attention on currently running projects. She would also talk to key people to learn more about the recent incidents and the main problems that caused them. For the structure of the content, there are a number of topics that are mandatory. Communication is one of them. Maria is a member of the association ‘Communication and Health’, so she knows how important communication for handover is. Knowing the processes, individual and groups workflows in handover and the coordination of handover activities is another important topic. The need for common and concise protocols for communication and coordination of handover processes can be included in the communication and coordination topics, but it also can be a separate topic.

One issue that often gets insufficient attention, according to Maria, is professional responsibility of the staff involved in handover. It is not about “my patient” or “your patient”, she says, it is about a patient who needs to get the best quality of care. Maria recalls a case, which she has used in patient safety training and which example she would probably use in the handover training: “When I worked in primary care and we had a patient admitted in the hospital, we visited the hospital to make sure that the patient was all right. It was so unusual that when we went there all doctors and nurses were looking at us wondering what we are doing there thinking that we didn’t understand our role. We simply wanted to communicate to them all the information we had available in primary care about this patient“. Although this case might be very particular and communication might also be ensured using other methods, she is aware of the importance of ‘knowing each other personally’.

What concerns the design of training, Maria is not fond on so called conferences where people just listen to a lecturer. She want to design a practical workshop where team work including a role playing and simulations around a real life case is the core activity accompanied with a discussion upon reflection on the individual and group experience. It also

would be useful, if people get some information to read prior to the training. She does not know whether this would work and from her experience such reading material should be very short, concise and clearly related to the training objectives.

Maria needs to resolve one crucial issue: how to make this training attractive for the personnel. Her experience shows that material incentives such as compensations in terms of time and money work well. Increasing chances for career development through the 'Carrera Profesional' (a step-increase system in use in the public sector accompanied by modest increases in salary) is another option and in this respect certification/diplomas, ideally with continuing education credits, should be specially mentioned. Maria would like, however, to use some other channels for boosting motivation. For example, she would like to emphasise on the responsibility of every professional to constantly improve her/his qualification. To attract the attention of more people, the training should sound practical and closely related to the work people do. If they see a real practical value of the training to their work, they would come. And Maria has a trick that has always worked: make people to think they are special, to believe they have been selected for this training among many other candidates. Ideally, Maria would like to use mix groups, including both doctors and nurses, as a handover always involves a team of different type of professionals, but she first wants to check the attitudes and levels of knowledge of the participants. If needed, Maria would make separate training for doctors and nurses before mixing them together. Maria also believes that technology would be a useful addition to the training although at the moment she does not know exactly what type of technology is most appropriate and what is the most effective and efficient way to include it in the training. She definitely wants all content of the training to be available and accessible all the time.

Making a formal evaluation of the knowledge and skills of the participants at the end of the training does not seem to be a good idea for this sort of training and these types of participants, but certainly people would love to have certificates/diplomas. Maria however would like to evaluate the quality of training in order to improve it. She usually uses questionnaires for this purpose, but would wish to include also informal discussions with the participants, either individually or as groups. Maria also knows that knowledge and skills are important outcomes of the training but to evaluate the real impact of the training on the practice of handover, we should look beyond the formal training to assess the extent to which the training has reduced errors, adverse events, complains, and re-admissions, although she realizes that this would be very difficult to evaluate. As an additional measure, Maria would distribute a survey to all stakeholders involved in the handover process. Training would contribute to establishing culture of handover. Training however is necessary but not a sufficient condition for it. It is a management issue and requires a redesign of the clinical Microsystem. People often think, says Maria, that it is training in handover that is the major issue. It is not. We need to put necessary structure, regulations, guidelines policy, and tools in place. We need to create a culture of handover.

Maria would like to organise follow-up sessions. She knows that it would not be easy as people do not have time and because of bureaucracy, but she really believes such events would be very useful. People will be able to discuss the impact of the training on the practice of handover in their organisations, present facilitators and barriers for implementation of knowledge and skills and bring real cases to the follow up training session, looking for a help from the group.

Dirk from The Netherlands

After a lovely weekend with the first beams of sun, Dirk feels totally revived to start working on a new challenge: the development of a training in handover. He is very enthusiastic about this training, because being a medical professional himself, he knows how important this topic is and how badly it is put into practice sometimes. Moreover, being also a trainer in the medical domain, he has been involved in training of both medical students and medical professionals for over ten years now, and he knows that handover has never been trained specifically as a skill. Recently, he has been involved in the development of several training sessions related to the topic of patient's safety, but these also do not focus on handover. Nevertheless he could use his experience as a medical professional but also his experiences of the training on patient's safety to develop this training on handover.

Well let's give it a try. As usual he starts to clarify the purpose of the training. He will make an appointment with those who wanted this training in the first place, the management, and will ask them what they exactly want to achieve with this training, what they expect from it. Furthermore he will interview those who are involved in handovers: medical specialists, general practitioners and patients. They could give him more insight in what makes the handover problematic and what could be done about it. At the same time, he could get an idea of the medical professionals' prior knowledge, skills and attitudes. Off course, he will also look for an existing training or other relevant material.

Although Dirk would prefer learning on the job to train handover skills, two training sessions of 2-4 hours, during the evening hours (i.e., after office hours), can also contribute well to the development of the handover practices of medical professionals. After 1,5 months he will definitely organize a follow-up meeting. He prefers that the group is small, about 10-15 people, not more.

He hopes he will get that many people to attend the training sessions. Not everyone is keen on training or has the time for it, or feels the urgency to improve their handover skills. He would rather make the training obligatory because this is such an important topic, but this is simply not possible. It should therefore be a very interesting and well organized training, so the word will spread itself that this is 'the most important and effective training in handover everyone should follow.'. He could also promote the training, by writing an article or providing a presentation on the problems concerning handover and urge the medical professionals to consider a training in handover. Or he can personally invite people to attend the training, using existing mailing lists. He could better think of some catchy slogans and posters to make the training known to everybody.

But okay, let's for now assume that people will attend the training. From his own experience as a medical professional who also has to deal with handovers he can start already analysing the handover situations he is familiar with, and think of some topics that should be part of the training. An important topic that should be handled first, is making participants more aware of the effects of problematic handovers and the importance of the training. Creating a sense of urgency and thereby increasing their intrinsic motivation. He thinks of presenting cases or even video clips from YouTube in which ineffective handovers resulted in adverse events or by presenting results from scientific results and figures regarding adverse events due to ineffective handover practices. Maybe he could use these also in case he needs to convince medical professionals to subscribe to the training.

Another important topic he definitely wants to discuss and train is the communication via (discharge/referral) letters or computer systems. He will discuss both the way of communicating and the content of the communication. Participants should be made aware of the fact that communication is not a straightforward process. Medical professionals like to hear some theory, so he will probably explain concepts like noise and mental models to

provide some theoretical framework. Furthermore a critical look at their own handover practices can make the participants more aware of the complexity of communication and the need to improve their handover skills. He will make them aware, oh yes he will.

The awareness could be even more increased when the training is provided to a heterogeneous group of participants (e.g., GPs and specialists, or GPs and pharmacists) so both parties involved in a handover situation can provide each other with feedback on the content of their discharge/referral letters and their communication skills. The beauty of this approach is that for instance a GP can actually tell a hospital doctor why his handover is not optimal or what could be improved. This makes the hospital doctor more conscious of the fact that his handover skills need to be trained or improved. Moreover, discussing each other's handover practices also contributes to the improvement of the information in the discharge/referral letter and the communication skills of the medical professionals involved. That is, when GPs and hospital doctors discuss with each other what information they definitely need from each other and how this information should be provided, they learn from each other and gain insight in each other's needs during handover. This can help, for instance, a hospital doctor to project himself into the role of the GP who is receiving the message, next time he will have to handover a patient. This will in turn have a positive influence on the quality of the handover. In addition to taking into account each other's needs, both parties should also become aware of the needs and role of the patient in the handover, whose health is after all the subject of the handover!

Another topic he wants to be part of the training, is related to the communication topic: the attitude of the professionals against each other (formation of an image) and how this can influence their communication. A heterogeneous or multidisciplinary groups would therefore also definitely be most effective. He really likes to let participants from different professions discuss with each other their perceptions of and experiences with each other's handovers.

Besides discussion between participants of different disciplines about experiences and especially difficulties with own handover practices, Dirk also likes to use simulation or role play during the training. Furthermore, he can use several authentic (real) cases of handover practices or vignettes for which participants have to write a letter of referral or discharge. Short movies or video clips which he could retrieve from YouTube could also be very effective and provide a nice variation in modalities in which the information is presented. A lecture could be used to motivate a large group of professionals and e-learning could be used for the theoretical framework. But giving lectures or using e-learning are to his opinion not very effective ways of training medical professionals in handover.

Before the training he will ask the participants to do some preparations. He could let them gather some of their referral and discharge letters and reflect on them. During the training the results of their reflections can be discussed. After the training, the only tasks the participants have to do is to put into practice what they have learned during training. He will organize a follow-up meeting in which the participants can share and learn from their experiences regarding the handover after the last training.

Of course, Dirk realizes very well that it is not fully in the hands of the participants whether they can put into practice what they have learned. That is, the organization should also provide them with sufficient opportunity to improve their handovers and practice new skills and they should show interest in the development of the handover skills of those who attended the training.

After the training it is probably good to provide the participants with a certificate, some kind of evidence of their efforts and development in handover skills. However, before providing the certificates, he will first ask the participants for their opinion on the training in

an informal group discussion. After the session he can provide the participants with an evaluation form on which they can provide their opinion on the training.

Regarding examination, he is not that sure about what will be best. On the one hand the medical professionals mostly have no problems with being assessed, they actually like it. On the other hand it is difficult and time consuming to develop a valid and reliable test, and it will only give a random indication of the participants' handover skills.

He also experiences some doubts with respect to the assessment of the effectiveness of the training. The easiest way of doing this, is to ask the participants' opinion on whether they think they have improved their handover skills. Another approach is to analyse whether the discharge and referral letters of the participants meet the criteria for effective handover. He will have to think about this again, after he has read some literature on research on handovers.

Well, he is full of ideas. Now let's see how he can put his ideas on paper so he can discuss this Thursday with his colleagues. But first...coffee and a biscuit.

Janusz Kaczmarec from Poland

Janusz Kaczmarec (JK) works at Collegium Medicum Jagiellonian University, Department of General Surgery, Krakow. He has been coordinating the post-graduate training of residents and the education of post-graduate students in his department for more than 15 years. The residents have their own 5 years education defined by MoH and then they come to the department led by JK to continue their education in an authentic environment. The postgraduate students after the sixth year of their studies come to the department for their post graduate training. “We modify it individually, says JK, as it depends on the needs of the individual, the possibilities of the department but we also have to follow the general requirements and standards prescribed by MoH”. In addition, JK leads regular workshops with GPs on.... He just went out of the office of the hospital director with whom he had an interesting conversation about handover in general and handover training in particular. The talk was triggered by some recent discussions initiated by EU. Back to his office, JK is reflecting on the discussion.

Handover is taught neither in undergraduate nor in post-graduate education in any specialty in Poland. However, although there is not a systematic training in handover, there are some individual modules included in the context of (a) the cooperation between different medical specialists regarding patient transfer in both direction: from family physician to a specialist for consultation and back to the family physician ; (b) in the context of family medicine, the coordination of care or acting as patient advocate, e.g., advising and assisting patient navigation in health care system ; (c) teaching family physicians how to write epicrysis in referral and how to read an epicrysis in discharge.

According to JK there are three important features of the handover training in Poland that make it different from other countries. Handover training would have effect in Polish healthcare if and only the current system of healthcare is considerably improved or even changed. JK: “You need to improve and fix the system and only then train people to enable their good functioning in a system. The most important is whether the system supports continuity of care or not. If not, as we have it in PL now, then the training doesn’t make sense because such handovers will be a disadvantage and nobody will be willing to participate. And even if there will be some participation, handovers will not change; they will remain as they have always been.”

Handover requires a change of mind or put it in another way a change of attitudes: attitudes to both patients and colleagues. Doctors in Poland relate to patient rooms, not to patients. What is also typical is that there is no trust between different levels of patient care. There is a lack of a proper recognition between GPs and clinicians.

The third factor is the blame for GPs incompetence in terms of proper diagnosis and proper referral. Here is how JK thinks of this issue: “As we often do complicated diagnostics, plan treatment, prescribe medications, and then they come back to a GP who changes the treatment, drugs, and nobody knows why. This results in patient condition getting worse and he comes back to a hospital. There is absolutely no flow of information between a hospital and PC. Information chart one way (from hospital specialists to a GP) and that’s it. The other way is a referral from a GP where a doctor usually writes very simply that a patient hurt his head or has angina pectoris or a stomach ache. Hoping they will admit the patient to a hospital for at least one of the conditions listed on the referral, and do the necessary diagnostics”. GPs must know about the diagnosis and recent operative methods, just the basics, in order not to send the patient to the district hospital for the mutilating gastrostomy but refer to university hospital for placing of the self-re-inflating prosthesis. Can a GP prepare a patient for surgery? Yes, and he doesn’t need to know the detail of surgical techniques, but needs to have the general knowledge about them. Proper diagnosis is crucial, e.g., patient had a

cholecystectomy and after some time is diagnosed with CA recti. A hospital is charged with such diagnosis, whereas GPs often refer patients with incorrect diagnoses: there is an incoherence of symptoms and diagnostic tests ordered. Secondly, the content should include info where to refer a patient. GPs often don't refer properly, e.g., refer to the centre that doesn't provide the type of services that a patient needs.

Generally speaking, JK does not believe that a handover training can change the system, attitudes and domain specific competence of doctors. But what if we begin bottom-up, designing a good handover training and then gradually improve the system and attitude as results of that. System and attitude change can be included as part of the training. The director asked even an easier question: what could constitute a good handover training provided that the system and attitudes are not a problem? The first issue to address in such a situation is motivation of the participants as medical professionals would prefer clinical training rather than a training in handover. Motivation has different aspects: (a) showing the usefulness of the skills acquired in such a training for the future work of the participants; incentives in terms of money, certification or getting education point as part of continuous educational programme; and training in handover counts as part of work load. What concerns real content and format of the training, JK would start with recalling situations when "we get patients from other doctors and do not understand the patient's situation as there is no info available. So, own bad experience is crucial here. Recall such hardships, both for doctor and for patients." Then JK would make a brief theoretical introduction to the issue, referring to the situations presented before and providing some other real life examples of good and bad practice in handover. The lecture part will be interactive as the participants comment and discuss issues posted by the training facilitator. The main part of the training is set of simulations with role playing typically in small groups. The groups preferably are mixed. JK: "The group needs to be multidisciplinary, i.e., docs with nurses because nurses need to know where their patients go to, how does it happen; a doctor is not always present in these instances. Also in case where some more info is needed, it is difficult to rely solely on a single doctor, who authorizes the referral or discharge. Nurses also need to know. Also the administration staff should be invited and participate: the medical secretary who works with medical records. This is very important. At the end we all are dealing with the same patient. "

Regarding the e-learning, as JK says, " it's not very enthusiastically received. In our study, only 50% of the most motivated part of the group indicated that they use e-learning. Those who did use e-learning, did better in tests and accommodating the new knowledge, The greatest barrier for e-learning is age. Access to a computer is easy nowadays and there is a comp in almost every GP practice, though it serves mostly administrative purposes. Not for education or working with patients. E-learning is not a good solution as interactivity and body language are very important while teaching. Handovers are no good area for e-learning."

JK is against formal exams, but he thinks certifications would be appreciated by the participants. The most preferred way for evaluating the quality of handover training is a questionnaire tailored to the training, not a standard one. From JK's experience, evaluations with general purpose questionnaires are schematic and not helpful for the improvement of the training itself. In addition to the questionnaire, some discussions after the training for providing immediate feedback would be useful.

The effect of the training could be measured with a number of methods: patient satisfaction questionnaire, experimental study with a control group, number of rejected referrals or missed diagnoses, mutual peer review assessment. "I evaluate the setting where I refer my patients and they assess me, whether the quality of consultation provided makes it worth to refer patients to me."

Appendix B. Use case diagram and Initial domain model presenting required objects and their interrelatedness

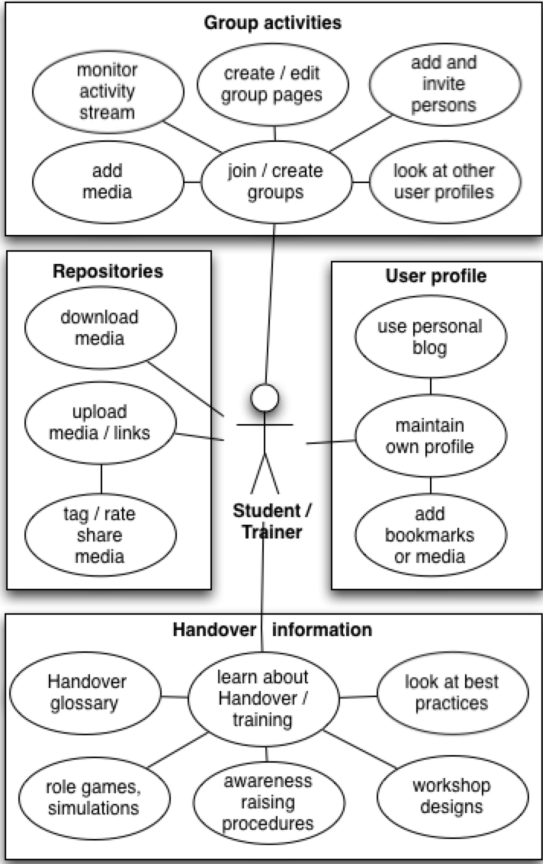


Figure 1. Use case diagram

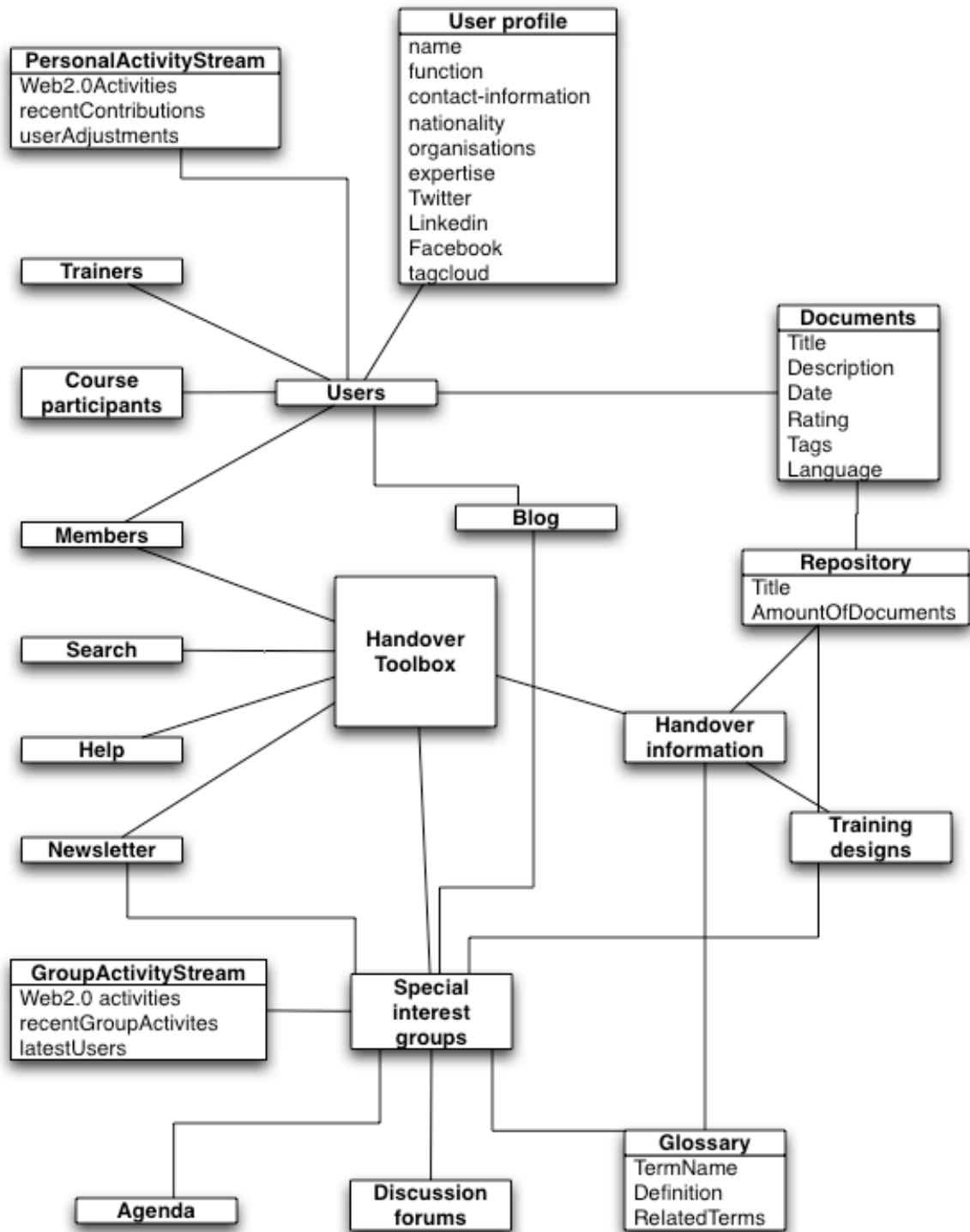


Figure 2. UML diagram

Appendix C. Statements gathered by Plus, Minus Interesting Evaluation clustered into 5 groups

Content

1. Lack of link between the content of the toolbox and found barriers in handover.
2. Show where the best practices are?
3. Is it also not enough to have quality content but it needs to be up to date and non-static.
4. There is too little content in it.
5. Use findings from research to develop content.
6. TB content, like SBAR = solution for handover problem.
7. We should develop some educational tools aligned with the results from the rest of WPs.
8. Using case scenario is like education on the job.
9. Two ways to look into the content of the toolbox: -search for examples/practical; -learning from other.
10. Experiences.
11. Examples you can take over and adapt to local situations is important.
12. Provide reviews of content both editorial and use.
13. Will want some ongoing research on what tools have been proven effective in what contexts.
14. Think about hand-over practices beyond Europe for adopting/adaptation in the EU context.
15. Will there be a state-of-the-art overviews on for example SBAR, written by European experts.
16. How do you know your tools fit?
17. Can it improve workplace or is it 'move work'.

Target Group

1. TB looks complicated for healthcare professionals.
2. Think about users that will develop training (older than 40 years old; Will they appreciate this 2.0 solution?)
3. When assessing the site, HP and GP are more interested in themes rather than in social networking.
4. Need for expert users.
5. Professionals are sometimes not so proactive.
6. This is for facebook lovers, not for doctors/nurses.
7. Might limit usage to young generation.
8. Might not be attractive for people who network in real life a lot.
9. Access to patients and their education (empowerment).
10. Adapt system to internet use habits of target group.
11. How to make people use the web site?
12. How to communicate the structure and possibilities to the participants?
13. Guidance tutor to use the tool effectively and keep up enthusiasm.

Purpose

1. If I did not know the purpose is handover, I would not have understood it.
2. This can be a great challenge because you can provide magnificent tools but the key is to get people to use them.
3. Toolbox = intervention; should be part of intervention.
4. Community vs education?
5. Learning from each other/ Experiences only?
6. TB = implementation strategy (solution for implementation problems).
7. I am not sure if health professionals would like to use a platform only for handover.
8. Best in smaller learning context than in larger conf?
9. Together with all other learning and other platforms.
10. How will toolbox be shown to make a difference on processes and outcomes on handover.
11. Be very clear about for WHOM it is a toolbox. WHY it is a toolbox for me and WHAT I can find there and what I can give OTHERS.
12. Do TB provides examples of other systems issues that will be affecting the effectiveness of the handover. I.e., I hope this is not going to provide help to only the communication issues.

Usability

1. Need for basics information: what is TB; what kind of tool can be found on this site; why is the TB made; how can a contribution be made.
2. Provide handover scaffolding (ex. "I do not know what handover is...what do I read/follow/download first?").
3. Users: needs a lot of work; not so easy; not a simple tool.
4. It takes a lot of time to go through the toolbox by yourself.
5. Navigation is too complex to get one's very concrete needs.
6. Too much info that is not sorted in the first page of the toolbox.
7. Sorting through posts by others may be time-consuming.
8. Profiles might facilitate, but require extra work (might hinder visitors to work with toolbox).
9. Make a standard front page for the tool.
10. May be beneficial to move the 'search box' to a more visible place on the webpage.
11. Ensure userfriendliness.
12. With accumulating content it can become difficult to find what you're looking for.
13. How to select what to "read".
14. Needs coordination.
15. Needs cultural adjustment?
16. Absolutely necessary: to have a toolbox translated in all EU languages.
17. How do you filter input?

Technology Platform

1. Too internet dependent.
2. ICT could be a major barrier. Should it not be as simple as possible. This is too difficult for ordinary people.
3. Provide handover scaffolding (ex. "I do not know what handover is... what do I read/follow/download first?")

Appendix D. Work activities during the stage of finalizing the toolbox

Finalizing the initial content of the toolbox

In order to improve and extend the initial content of the toolbox, the following activities were employed:

- *Information stored in the 'Handover tools' section.* During the Amsterdam Handover meeting it was decided to further improve the information presented in the section 'Handover tools' that presents the static information that can not be altered by visitors. For this purpose guidelines and a format were composed, that was filled out by the group leaders. In addition a telephone call session was organized to further discuss and outline the intentions for improving the texts in this part of the toolbox. During the call it was stressed again that only evidence-based tools should be provided in this part of the toolbox and that evidence for effectiveness of tools should be provided in the text.
- *Welcome text at homepage.* Based on the findings of the formal evaluation among users it was decided to rewrite the welcome text at the homepage: it was shortened, hyperlinks for easy access were added and in the text it was emphasised that information stored in the toolbox and membership of the toolbox are for free.
- *Introduction text of the various groups.* The formal evaluation revealed that some users mentioned that the introduction texts of the different groups were not informative and too long. Therefore, texts were shortened providing only the most necessary information in one paragraph and linking to the group pages and files. This was done for all groups in a similar way.
- *Integration of 3 groups on training issues into 1.* It was decided to merge three groups that were all related to training, into a single group consisting of all the necessary information regarding handover training. This new group, named training design, consisted of three sub-parts that provide information on training design, training methods and training evaluation, respectively. The underlying reason for this merging is that it is expected that integrating the different materials into one group will better support visitors to find and retrieve training information more easily.
- *Including video to provide information.* The advantage of video is that it offers the possibility to inform people in a quick way, allowing them to relate to the handover issues in another way than by just reading texts about this subject. During the Amsterdam Handover meeting, several project members were videotaped, resulting into a set of vivid accounts that inform visitors of the toolbox about the importance of high quality

handovers and the benefits of the toolbox for enhancing the quality of handovers. These videos were slightly edited and stored in the toolbox in the section presenting the Handover Tools. In addition a two-minute-video trailer was edited that integrates the core statements of the set of videos. The trailer is available on the homepage of the Handover toolbox, whereas the individual videos of the Handover project members are available at their profiles or on suitable places within the toolbox.

Finalizing the user-friendliness of the toolbox

The improvements regarding the user-friendliness were mainly based on suggestions collected during the formal evaluation of the toolbox and involved the following activities:

- *Searching.* Especially users that have no experience with social media experience difficulties with finding the right information. It was therefore decided to make the Search button more visible.
- *Membership.* The membership registration procedure was simplified. The version used during the formal evaluation caused some confusion and not all users appeared to succeed in becoming a registered member.
- *Homepage.* Users mentioned during the formal evaluation that returning to the homepage was difficult and therefore a button ‘homepage’ was included.
- *Buttons.* The sequence of the Community buttons at the top of the toolbox was rearranged with the most important buttons positioned at the left side, starting with Tools as the first button.
- *Help function.* To enable visitors to ask for help while exploring the toolbox, a help button was included in the set of Community buttons at the top right of the toolbox. In addition, the welcome text at the homepage also offers a link to help utilities.

Improving the use of the community aspects of the toolbox

The following activities were employed to improve the toolbox as a community.

- *Ratings.* During the group discussion with external experts at the Amsterdam Handover meeting concerns were expressed that everyone can upload information to the toolbox. The concern is that this might result into low-quality information. A simple mechanism to inform about the quality of information, is to allow visitors to rate the information files, in the long run the wisdom of the crowd will prevail. Rating in the toolbox is quite easy and

to ensure everyone is able to perform this a guideline on this subject is included in the toolbox.

- *Bookmarks.* In order to support the toolbox users to contribute information to the toolbox the OUNL team implemented a so-called bookmarklet. A bookmarklet allows adding of related information from the web from the own web browser directly to the toolbox and even to a specific group space. The bookmarklet is available under the URL <http://handover.ou.nl/pg/bookmarks/bookmarklet/>.

The "bookmarklet" is a little program that sends web pages a Handover toolbox member marked as bookmark to the toolbox. It allows to share any resource the user discovers on the web with the handover toolbox community or a specific group without navigating to the toolbox. The discovered information can be extended with additional metadata information (description of the resource, keywords, etc.) to make the discovered resource more easily to understand for the handover toolbox members.

- *Membership profile.* Everyone who becomes a registered member needs to fill in a short file with items about one's work, experiences and interests. The quality of the information stored in this file supports visitors in connecting to others with similar interests and work. All Handover team members were asked to edit their own membership profile to ensure these were fully updated and correspond entirely with their current work and interests.
- *Guidelines.* A concern that arises at the start of a learning network like the Handover toolbox is that visitors consider this too much as a static website, ignoring the opportunities for sharing information and ideas. To overcome this persistent problem the group leaders of the different groups in the toolbox received a set of practical recommendations for encouraging visitors to become more active as a group member.